MOTOR AGE

Brief Story of Chicago's Show

CHICAGO'S seventh annual show opens, the crowd on the first night being larger than that of a year ago. The decorations are even handsomer than the preceding affair, the features being oil paintings by Maratta, while large water color motoring scenes circle the gallery. Papier mache replaces staff in the decoration scheme.

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The show is larger than the two New York events put together, there being on view 410 pleasure rigs, chassis, electrics and commercial wagons, as compared with 359 last spring and 366 in 1906. Not a foreign car is on view, with the exception of one Swiss commercial rig, while there is a noticeable increase in the number of runabouts. Touring cars have fallen off slightly as have limousines and landaulets. The greatest increase is shown among the air-coolers, there being thirteen now as compared with only one in the preceding show, largely due to the popularity of the motor buggy.

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Exhibitors in the commercial show, the first one ever held in this country, are given a scare when the decorations in the Seventh regiment armory burn. The damage, however, is slight because of the flimsy nature of the bunting. The damage is repaired in a few hours and the show is once more open to the public.

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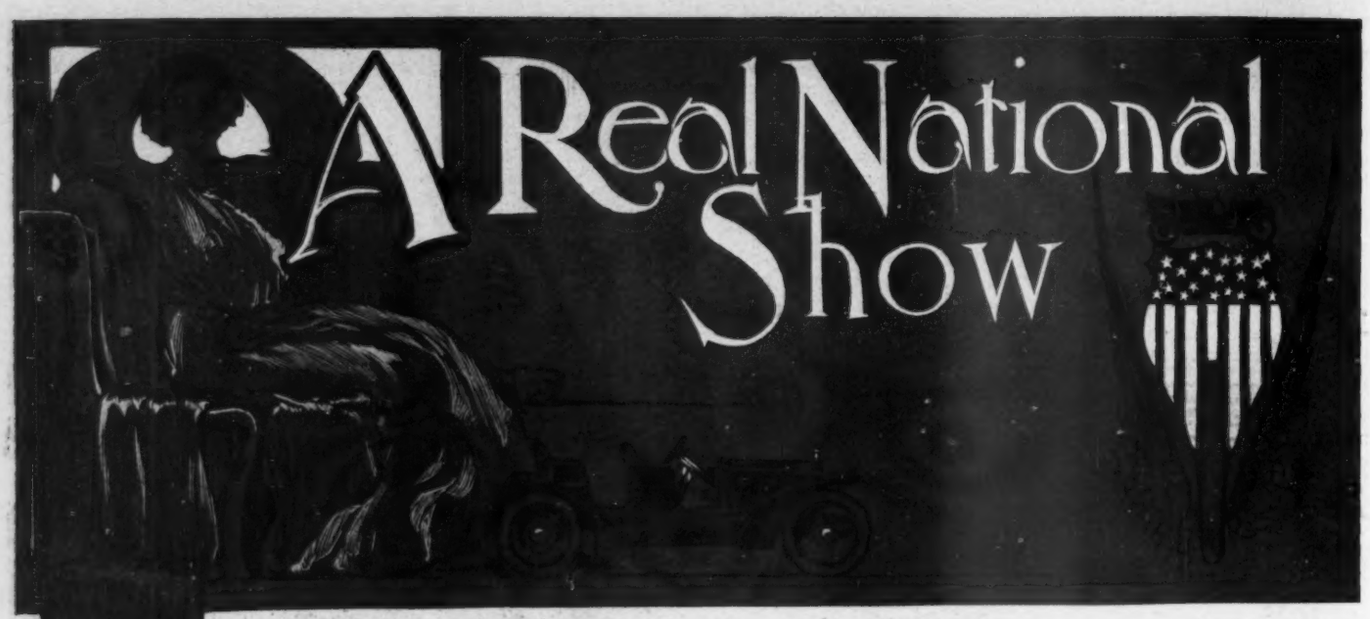
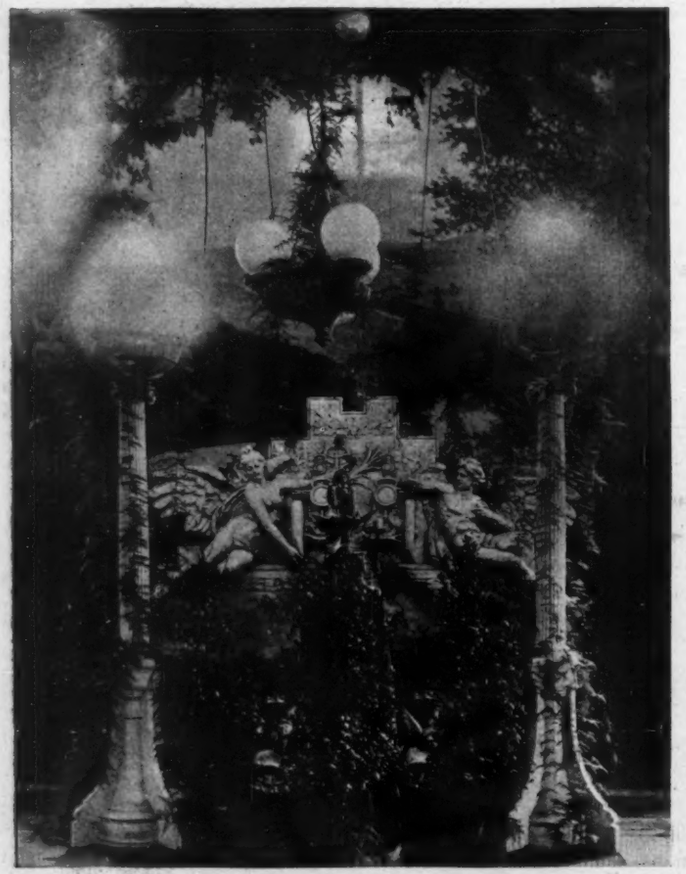
Manufacturers of commercial wagons are interested in the organization of a national body. A preliminary meeting is held and promises of support are given by most of the concerns taking part in the show.



CHICAGO, Nov. 30—The seventh annual show, the real national show, of the N. A. A. M., is on in full blast and if there is any stringency in the money market it would be impossible to tell it from the appearance of the big crowds which surged through the big buildings tonight, everyone enthusiastic, everyone apparently motor-wise to a more or less degree and the signs all pointing to a show that will produce business, not only from the agent but from the retail buyer.

The formal opening of the show took place at 2 o'clock this afternoon as per schedule. At that hour there were few who were not ready with their exhibits, so the general public found on display the most comprehensive and complete exhibition of motor cars and accessories ever gotten together under one roof in this country—a show that is 30 per cent larger than any other affair of the kind in America outside of Chicago. This show is even bigger than last year's effort of Sam Miles', and that was thought to be about high water mark. While no official figures have been given out, it is apparent to even a one-eyed man that the crowd tonight was larger than on any previous opening in the history of the Chicago show.



LEADING TO THE CAFE IN THE BASEMENT

As usual, the pesky weather man dished out real show weather. Never has he treated Miles kindly in this respect and it is a common jest in the aisles that even if the show were held in August the weather man would dig up some snow or extremely cold weather. This time it was no exception. All week it had been real Indian summer, chilly in the morning but warm during the day—just the kind ordered by the contest committee of the Chicago Motor Club for its reliability test, which came to an end Thursday night. Friday was a continuance of this same brand, but on Saturday it started snowing and in the afternoon the snow became a mixture of sloppy sleet that was calculated to take away any show enthusiasm. This sleet lasted until after 9 o'clock, when the weather man turned Jack Frost loose. This was an improvement, for the nimble chap soon dried up the streets and by midnight the stars were out and there was a prospect of better weather for the rest of the week.

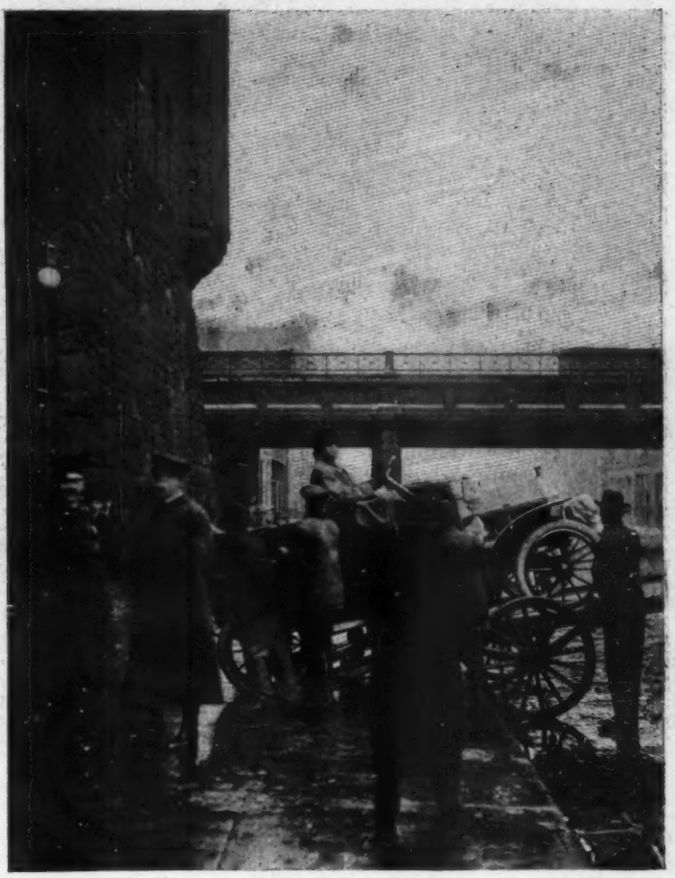
But outside the weather, the opening was a grand success. The show this year differs from its predecessors in that it embraces a commercial exhibit in a separate building, while the motor cycles have been grouped in one department. To do this of course required more space, so Manager Miles annexed Tattersalls', scene of a bicycle show in the middle '90's, in addition to the Coliseum, the Coliseum annex and the First Regiment armory. Tattersalls' now is known by the more high-sounding title of the Seventh regiment armory and it houses the commercial rigs. As usual, the Coliseum is the main building and in it are housed the majority of the car exhibits, with the main bunch of sundries exhibits circling the building in the gallery. The demand for space was so keen that Miles was obliged to go down into the basement and there install those who insisted upon getting in even if they had to go beneath the surface of the street. In the annex are the accessories and motor cycles on the second floor and more cars on the first floor. In the First regiment armory are cars on the main floor and sundries in the gallery. This gives an idea of the layout of the show.

As for the show itself, it must be admitted by even the easterners that Miles has maintained his usual pace and, to put it in slang, has it on anything else of the kind ever attempted. Certain it is that never before has the show scheme been worked

down to such minute details. Every contingency apparently has been provided for and there is little chance for criticism. One might protest against the dirty alley connecting the Coliseum and the First regiment armory, but an investigation shows it is not Miles' fault. In previous years the connection had been established by means of a long wooden tunnel, a breeding place for pneumonia and a death trap in case of fire. But this year the city authorities refused to permit the construction of this tunnel and would not stand even for a board walk, ruling that the alley is a public thoroughfare. So Miles was up against it. The best he could do was to roof the alley with canvas, leaving the sides open. The alley is asphalted but there are huge holes now that collect the water and dirt, making the going decidedly dirty. It might be improved a lot if Miles would put a gang of men to work sweeping it, but this had not been done up to tonight and in consequence the inhabitants of the armory suffered, for few women, once they got a peep at what confronted them, would make the passage, and as almost everyone came in through the Coliseum the armoryites suffered somewhat. How it will work out the rest of the week remains to be seen.

Outside of this, however, this is a show in every sense of the word, with the Coliseum the beauty spot. While last year's scheme has been retained in a general manner, there have been improvements which add considerable to the beauty of the scene. In the first place the staff decorations have been discarded and Manager Miles has become a pioneer in the use of papier mache as a substitute. It has proved to be most acceptable. Then over each booth is a handsome oil painting by Maratta in which the clever artist has incorporated a car bearing a likeness to the one on exhibition in that particular booth. An improvement also is noticed in the paintings that hide the wooden elevation of the gallery running around the Coliseum. These are water colors and good ones at that. There are 142 of them and they cover 9,000 square feet of space. In marked contrast to the usual motor scenes, the cars are drawn with remarkable fidelity to details of construction which makes it a pleasure to look on them. Each one of the paintings is a reproduction of a real motoring scene and one gets enlarged ideas of previous events which have been made history by means of the artist's brush.

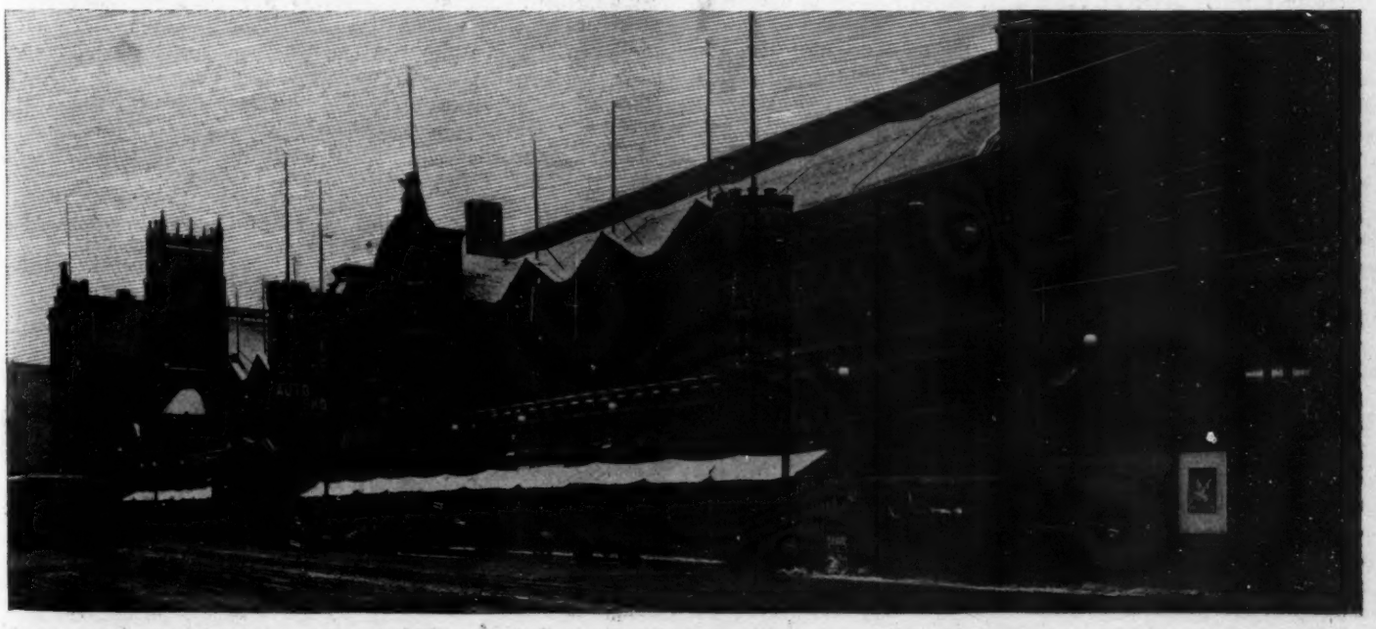
As for the booths themselves, the decorations are so much in harmony with the entire color scheme that its individuality does not impress one. There is a general soothing effect, restful to the eye, from floor to roof. The daylight streams in in a subdued manner because of the decoration in the roof, which is one immense skylight, the glass being hidden by the bunting which is festooned in graceful loops from roof to gallery. In the First regiment armory the same lines are followed out although



ONE OF THE FIRST REGIMENT ARMORY CARS ARRIVES

not in quite so elaborate a manner. In both buildings the aisles are so wide that there is no uncomfortable jostling or fighting to get around. People have room in which to stop and inspect a car that impresses them.

It is in the Seventh regiment armory, though, that one is struck by the transformation from a huge barracks to a well-planned display of commercial rigs. Old Tattersalls' never looked better in all its 15 years of existence. In the roof there are yards and yards of yellow and blue bunting, with huge sunbursts of the same colors at either end. The papier mache decorations consist of a single narrow strip running along the top of the booths. The side aisles have yellow and blue bands and



THE OLD FAMILIAR SCENE IN FRONT OF THE COLISEUM ON WABASH AVENUE

NIGHT SCENE IN FRONT OF THE COLISEUM SHOWING THE ELECTRICAL EFFECTS

the center only yellow. However, the blue in the other aisles hangs so low that the passer-by gets the same effect as if both colors had been used in the main street of this enclosed business city in the big building.

Work on preparing the buildings for the show had progressed so well that Miles' men were ready for the exhibitors to move in Friday as per custom, but the fact that Thursday was a holiday slowed the tradesmen somewhat and Friday afternoon not many had lined up their exhibits. In the First regiment armory there were a couple of accessories exhibits ready in the gallery, while on the main floor only three cars had been installed. Over in the Coliseum things looked better. Probably half of those on the first floor had some semblance of an exhibit, while in the gallery the accessories folk were arranging their goods. Workmen were hanging the water color paintings around the gallery. But it all was orderly confusion and no one worried. Matters were in a worse state in the annex, which always is a sort of receiving house for the exhibits. The back door was open and through the place there swept chilly blasts which made the exhibitors in that place delay installing their exhibits until those in the Coliseum proper had their wares lined up.

But Friday night and Saturday morning everyone worked like Trojans, with the result that most every exhibit was in place. The Premier people were unfortunate in that their cars did not get here today, which will delay the installation of their exhibit until Monday. In the Austin booth also there were no cars in the afternoon. The Imperial, which had been assigned space next to the Peerless, consented to give it up to its neighbor and move over into the armory. These incidents were not noticeable to the spectators, though, and half an hour after the official opening the entire show was running most smoothly.

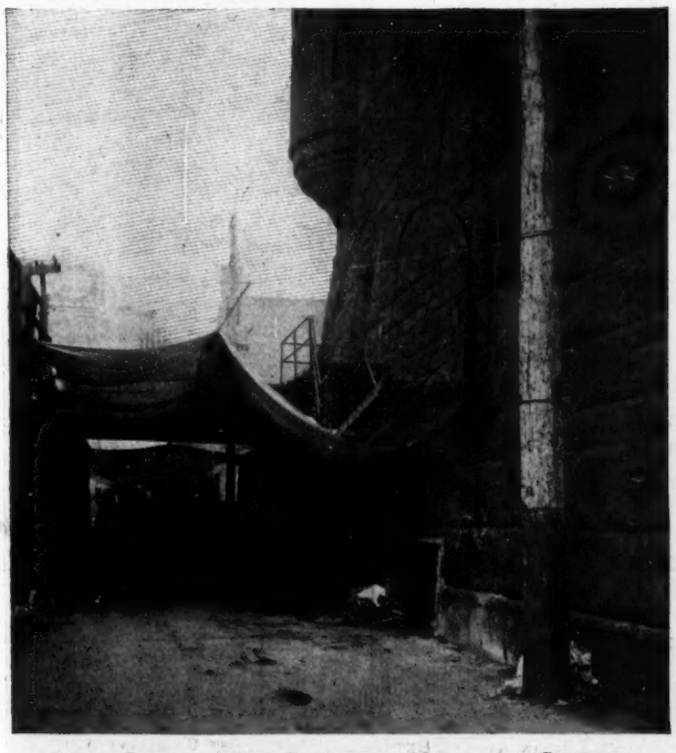
Each booth had some unique features. The Cadillac has a chassis with the motor operated by electricity. Glass windows allow the spectators to peek at the interior of the engine and see for themselves just how the power is developed. On the Stoddard-Dayton stand is a similar contrivance, all of which is of great educational value to the public, for the average man can not understand just how the trick is turned. The Gearless people are displaying the six-cylinder which accompanied Pedestrian Weston on his walk from Portland, Me., to Chicago, while the Maxwell shows its trophies of the chase, consisting of twenty-five silver cups, shields and punch bowls won by that sturdy car. The Pierce-Arrow place has six cups representing that many victories in Chicago contests by Henry Paulman, the chief trophy being the Silent Knight cup, won in the recent economy test. Up in the accessory section there is a case containing five Stewart speedometers in operation, showing the different speeds, one being as high as 78 miles an hour. One of the speedometers is cut away so that its internal workings may be seen.

It seems to be the common practice to come in through the Coliseum front door, take in all the sights of that big place,

MICHIGAN AVENUE EXTERIOR OF THE FIRST REGIMENT ARMORY

How the Motor Cycles Look in Their Segregated Quarters

another journey through the alley to the Coliseum, where the spectator discovers there is a subterranean department—something new for Chicago shows. It is located in the southern extremity of the building, about under the annex floor. Going through the cafe one wanders through intricate passages, finally coming into a big room in which are installed twenty exhibits of cars and twenty-five of accessories. It is like discovering a buried city and is an unexpected treat. Here are found many old friends and a circle around the room leads to an exit which brings one into the annex, which is easier to navigate than the cafe route. There's no denying, though, that this basement subdivision is far from the madding throng and that there should be more publicity given this oasis in the desert. It isn't half bad once you get down there, but the trick is in getting wise to the location of the place.

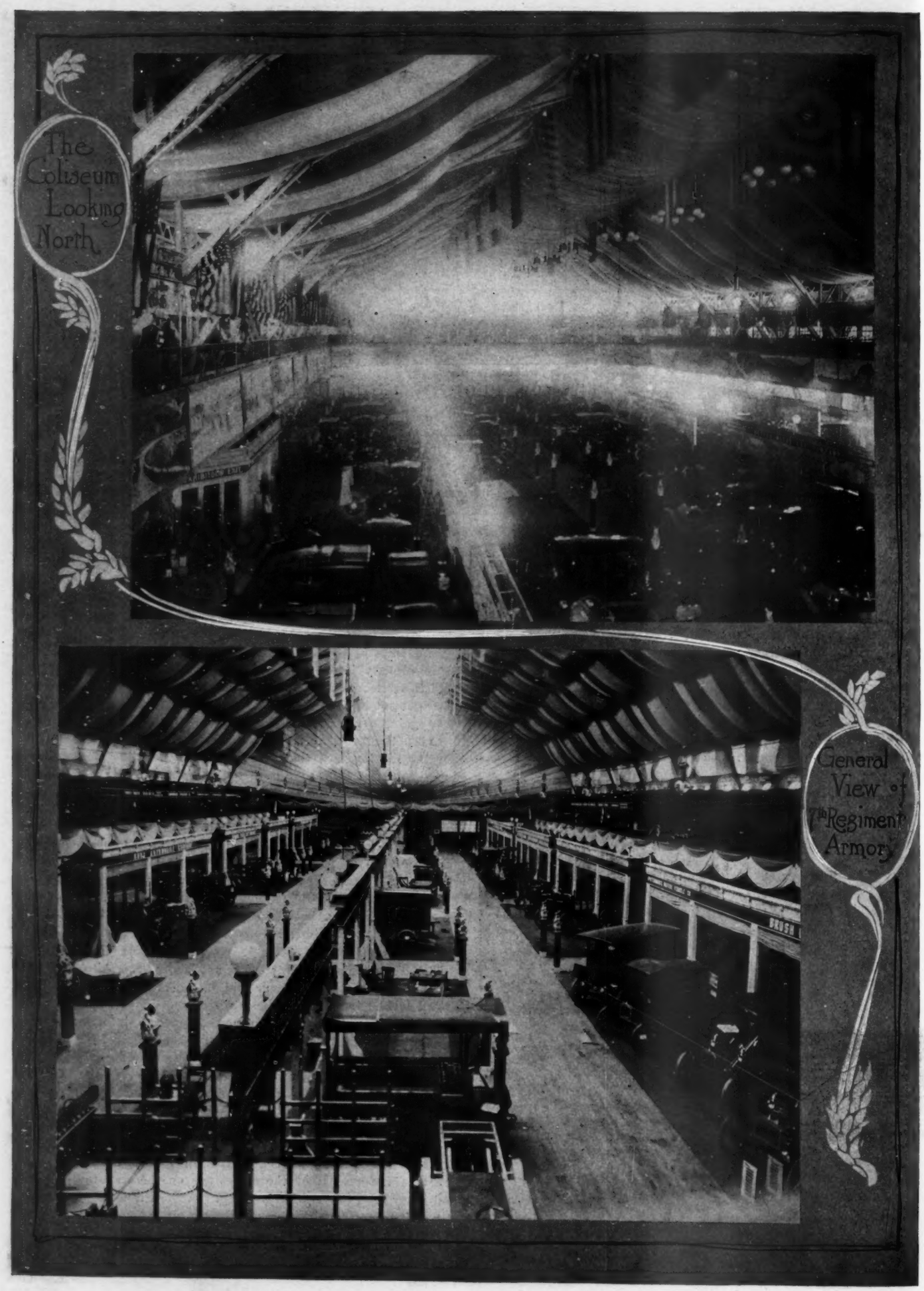


Canvas-Covered Alley Connecting Armory and Coliseum

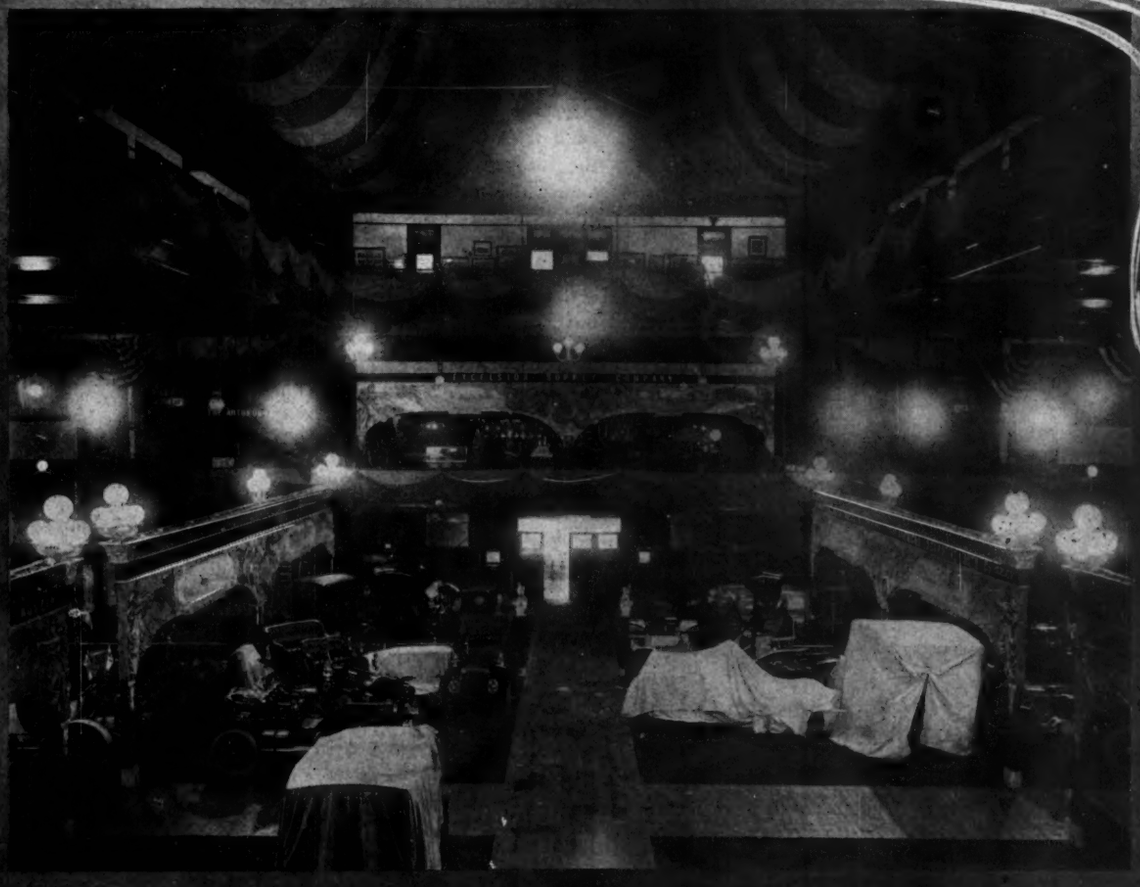
In a way the commercial exhibit is just as badly off, for only those directly interested think of making the trip through the cold to Sixteenth and State streets, only two blocks away. The management is doing the best it can, though, to crowd the place, even going as far as to provide a special line of motor buses between the two places. It is time well spent going there, too, for the display is a comprehensive one, including almost every prominent make. The crowd tonight was a slim one, though, the attractions of the big buildings on Wabash avenue keeping the people until within an hour of closing time. Then the aisles were comfortably crowded and it was pleasing to note that most of them looked as if they were vitally interested in the development of the business rig. They asked intelligent questions regarding the cost of maintenance, etc., and while some of them evidently were novices in the motor game, they had come to be educated, believing that the days of the horse are numbered and that it will not be long before the motor will push the equine off the streets.

The commercial exhibit was not quite complete to-night. Lambert had not arrived nor had Logan or Gifford-Pettit. The crowd looked in vain for the much touted Alden Sampson train of which they had heard so much, but the information was handed out that this novelty will be here early in the week. Oscar Lear had only one or two of his wagons on show. Sprinkled in with the business rigs were several pleasure cars—the Streator, Colt and Brush. The Brush, though, has commercial rigs in addition to its little runabout.

As usual there are some of the cars not represented in the show and the representatives of these are keeping open house during show week. These impromptu affairs are being well patronized, for most of the stores are on the way to the show and many stop to see what's doing. In the Franklin place there is a unique stunt going on—an attempt at a non-motor stop run of 180 hours' duration as a demonstration of the efficiency of the air-cooled motor. S. A. Miles cranked the engine. President Cobe and Secretary Van Sicklen, of the C. A. C., were witnesses.


The Coliseum Looking North
General View of 7th Regiment Armory

The Coliseum Looking South East



Main Aisle of the Regimental Armory

POWER WAGON MAKERS ARE ORGANIZING

First Meeting of the Proposed Commercial Vehicle Manufacturers Is Held—Other Late News of the Show

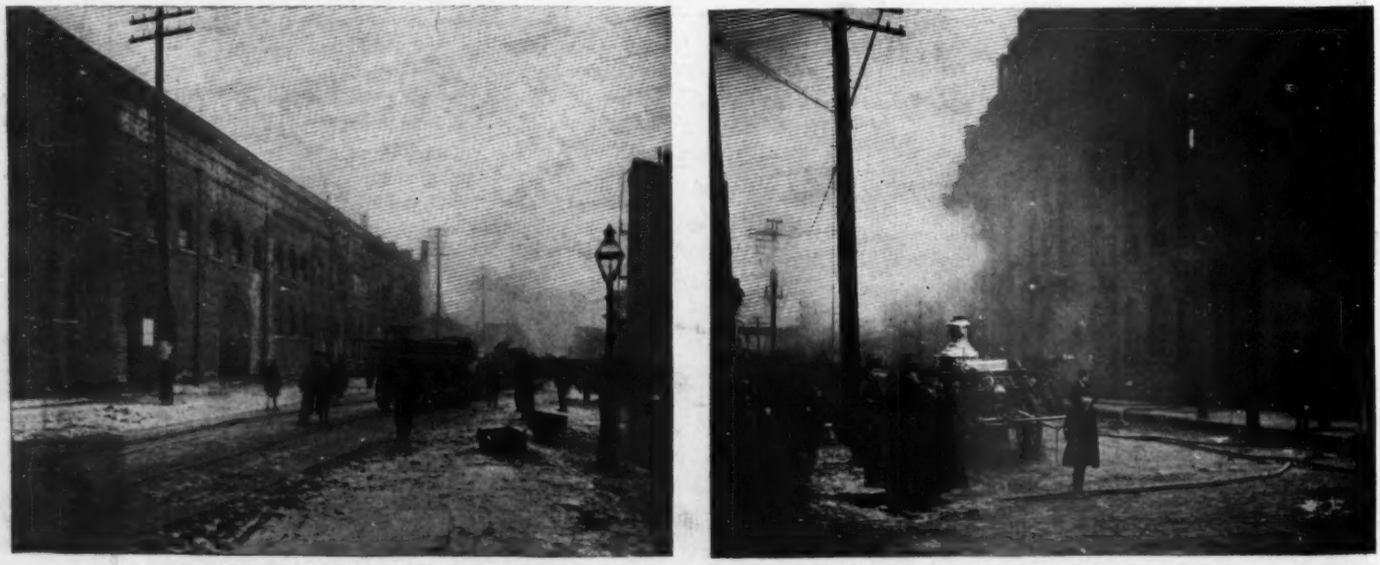
CHICAGO, Dec. 3—The Commercial Vehicle Manufacturers' Association was formally launched tonight at a meeting held in the Seventh regiment armory, and one more motoring organization has been added to the already long list. Carl Holdredge, sales manager of the Coppock Motor Car Co., of Decatur, Ind., claims credit for being the originator of the idea, and it was largely due to his energetic rounding up of the commercial section that eleven representatives of the business wagon interests assembled to discuss the feasibility of forming an organization "to further the interests of the commercial proposition without antagonizing the pleasure car makers' associations." Of the twenty-one makers of power wagons showing in the Seventh regiment armory fourteen of them have agreed to join the new organization. In the case of the other seven it was impossible for Holdredge to spring his proposition on their representatives, but it is thought there will be little trouble experienced in getting them into the fold. If they all come in, which is thought more than probable, the charter list will show the following names: American Motor Truck Co., Lockport, N. Y.; Brush Runabout Co., Detroit, Mich.; Commercial Motor Truck Co., Plymouth, O.; Coppock Motor Car Co., Decatur, Ind.; Couple-Gear Freight Wheel Co., Grand Rapids, Mich.; H. H. Franklin Mfg. Co., Syracuse, N. Y.; Gifford-Pettit Mfg. Co., Chicago; Knox Automobile Co., Springfield, Mass.; Lambert Motor Truck Co., Anderson, Ind.; Oscar Lear Automobile Co., Springfield, O.; Meiselbach Motor Wagon Co., North Milwaukee, Wis.; Mitchell Motor Car Co., Racine, Wis.; Pittsburg Motor Vehicle Co., Pittsburg, Pa.; Pope Motor Car Co., Indianapolis, Ind.; Rapid Motor Vehicle Co., Pontiac, Mich.; Reliance Motor Car Co., Detroit, Mich.; Safir Automobile Co., Zurich, Switzerland; Sayers & Scoville, Cincinnati, O.; Studebaker Automobile Co., South Bend, Ind.; Weeks Commercial Vehicle Co., Chicago; Worth Motor Car Co., Kankakee, Ill. Max Grabowski, of the Rapid company, presided at the meeting, and Mr. Burke, of the Lambert forces, served as secretary.

Outside Shows Are Popular

As is usual with most national shows, the management found itself unable to accommodate all those who sought space and in consequence of this lack of room several prominent concerns have been forced to run shows of their own in the establishments of their local representatives; or, in some cases, in whatever store happened to be vacant along the row. The Cartercar is one of those shut out of the national affair and in order to gain the necessary publicity and to show its new models to the public it has taken steps out of the ordinary. Its local representatives, Hagmann & Hammerly, are located on the west side and as this is too far from the downtown district, the store at 1305 Michigan avenue has been secured for the week. In addition to this the Cartercar people have secured the vacant lot just south of Owen Fay's store at 243 Michigan avenue, on which it has erected a board hill somewhat resembling a toboggan chute and said to be of 50 per cent grade. On this incline are given daily demonstrations of the ability of the Cartercar with its friction-drive to climb hills. The Blomstrom is another that could not get space and it is located at 1346 Michigan, in the store formerly occupied by R. M. Owen & Co. before they discontinued their Chicago branch and which later will be used by the Michelin tire people. Here the various models of the Blomstrom line are being exhibited and the display is attracting considerable attention. The Great Chadwick is being featured in the private show of the Hamilton Automobile Co. at 1222 Michigan avenue, which also is agent for the Pennsylvania and the Isotta Fraschini. The American Sales Co., which handles the American roadster, Marion and Overland, is exhibiting at 1253 through its local agent, the Favorite Automobile Co. Like most of the others, the Favorite company has tastily decorated its store and the show is attracting the attention of many, the Marion and Overland being new cars in Chicago. The Silent Knight, a Chicago-made car, is holding a levee in its salesrooms at 1238 Michigan avenue. The Earl also is being shown by Adams and Engs.

Fire Scare in Seventh Regiment Armory

Exhibitors in the Seventh regiment armory, where the commercial show is being held, were given a genuine scare Tuesday morning, when fire broke out in the southern end of the building. In a trice the flames were running up the bunting with which the interior was decorated, but the bunting burned so fast the flames did not communicate to the wood. Some of the commercial cars were scorched some, but the entire damage can be covered by $1,000. A Plymouth fire truck, delivered to the insurance patrol in the morning, made its initial run to the commercial show fire. After a few hours' delay the show was reopened, but minus its roof draperies.



TWO SCENES NEAR THE SEVENTH REGIMENT ARMORY WHEN FIRE THREATENED THE COMMERCIAL SHOW

FINE SHOW FROM BUSINESS STANDPOINT

Exhibitors Well Pleased With Start of Chicago Exhibition—Many Sales in Sight and Some Already Made

CHICAGO, Dec. 4—Making only mild allowances for the financial stringency, this is the best business show ever held in Chicago under the auspices of the National Association of Automobile Manufacturers. This sounds like a bold statement, but a trip around the show will verify it. From the moment the doors were thrown open Saturday afternoon visitors have been making serious investigations as to the cars they desired to buy, and the first night was in marked contrast to the openings of previous shows, at which the crowds have been made up largely of rubbernecks. Undoubtedly the live stock show which is now in progress has helped the motor car exhibition, for it has brought to town many farmers, who have been converted to motoring and who are looking around for suitable cars. Motor Age has claimed all along that it is the farmers who have the money and that it is this class which is going to be an important factor in the motor game for the coming season. This statement has been borne out by facts, for the rural-looking gentlemen who have come to the Coliseum evidently have money which they are anxious to invest in cars. The exhibitors are more than willing to accommodate them, and in consequence business is flourishing. It must be said that the farmers do not make up all the buying public, however.

Exhibitors who were at New York do not hesitate to declare that Chicago is far ahead of Gotham in a business sense. Edgar Apperson declares he did more business the first night and that there was more in sight the first hour than in the whole week at New York. The demand, he says, is varied, the high-priced car being as much sought after as is the low-priced one. His assertions are backed up by others like J. V. Lawrence, of the Pierce Arrow exhibit; H. P. Brnastetter, with the Dragon and Wayne, and many others who are delighted with the unexpected prospects of business. Among the accessory people there is the same feeling, and Sales Manager McGookin, of the Stewart & Clark Mfg. Co., said that up to Tuesday noon he had sold 600 speedometers, far and away in excess of anything he had looked for.

Dragon Company Is Reorganized

Announcement was made at the show that the Dragon Automobile Co. has been reorganized with a capital of $1,000,000 under the name of the Dragon Motor Co. The officers are J. Edward Calhoun, who retires as a managing director of a Canadian coal company, president; A. L. Kull, vice-president, and R. G. Kelsey, secretary and treasurer. The directorate includes H. F. Rawle and C. A. Pickard, president of the Salisburg Steel Works. Mr. Kull will act as sales manager, with John W. Haynes and J. C. Middleton as assistants. Mr. Kelsey and John O'Brien will be in charge of the factory.

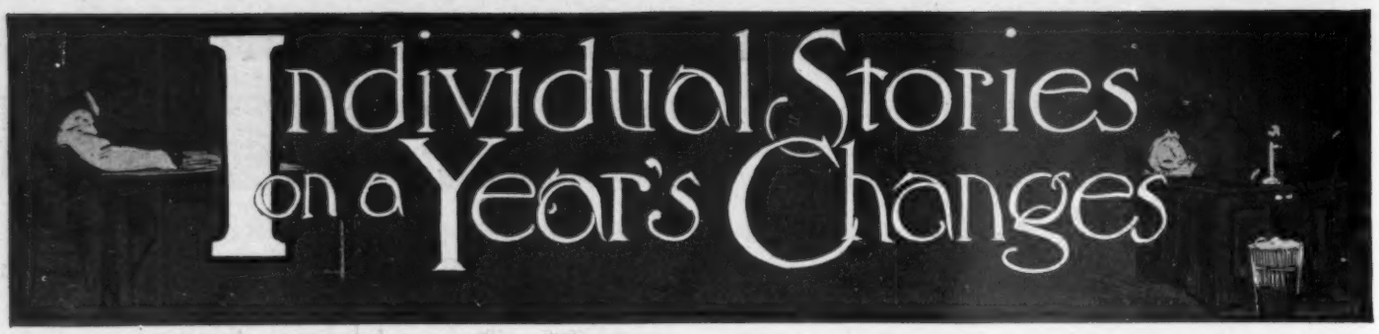
A. A. A. Leaders Assemble in Chicago

National officers of the American Automobile Association are assembling in Chicago for the meetings which will be held Saturday. On the bills are sessions of the executive and technical committees, both of them recently appointed. Saturday there is to be a conference between the national officers and the leaders of the Illinois State Automobile Association, at which time it is expected there will be a threshing out of the case of the Chicago Motor Club, which has had several stormy sessions with the powers that be owing to a so-called misunderstanding as to whether or not the local organization is in arrears of dues. Matters have been brought to an issue by the action Tuesday night of the board of directors of the motor club, which resolved to demand of the state association a return of the money paid early last spring as dues for the year. The motor club claims that when it filed its application it did so with the understanding that it paid its dues for 1 year. The state association says the fees only paid up for the fiscal year, which only had a month and a half to run at that time. When the motor club refused to pay when the fiscal year started it was declared to be in arrears. The motor club also asserts it never has been declared a member of the state association, therefore it cannot see how it can be on the wrong side of the ledger. The A. A. A. executive committee will also discuss the question of whether or not it shall retain control of track racing.

Dealers' Banquet a Curtain-Raiser

The Chicago Automobile Trade Association last year inaugurated the custom of holding its annual banquet just before the show and this time the custom was followed, the big feed being given last Friday night in the banquet hall of the Chicago Automobile Club. There was a large and enthusiastic turnout of the local dealers, many of whom brought their visiting trade friends with them. President Gunther presided and among the speakers of the evening were Dr. W. A. Evans, commissioner of public health, who represented Mayor Busse and Chief of Police Shippy.

SECOND ANNUAL BANQUET OF CHICAGO AUTOMOBILE TRADE ASSOCIATION AT CHICAGO AUTOMOBILE CLUB



IN THE following is told in the makers' own words the exact differences between the 1907 and 1908 models of motor cars, the new fashions being on exhibition in the present show in the Coliseum and the two armories:

Rambler, Thomas B. Jeffery & Co.—A distinctive change in the 1908 models of the Rambler line comprises in the four-cylinder models a new motor in which is embodied many new features. These include an offset crankshaft, new location of the valves, which are now set in a side extension from the cylinder head and operated by direct thrust; a new one-piece crankcase, access to which is attained through a hand plate covering the entire side of the case. The opening thus provided is 9 by 23 inches. Exhaust and inlet manifolds are made in one piece, with the carbureter located on the right hand side of the motor, out of the way of valve levers and mechanism. The transmission gear, while similar in construction to that of the model 24 of 1907 line, is now of the selective type, with roller bearings throughout. The brake mechanism is greatly increased in power and effectiveness. This now comprises two sets of brakes, one expanding and one band brake, operating in connection with pressed steel drums bolted to the drop-forged rear wheel hubs. The brake drums are 13½ inches in diameter, with 2½-inch faces, and the total braking area aggregates 406 inches. Motor control is through levers set over and concentric with the steering wheel, which is much larger in diameter than in previous models. Fenders are of a new and artistic design, with linings both front and rear, also between frame and running board. The changes in the two-cylinder model are mainly in motor construction, the cylinders now being waterjacketed, both sides and head, and placed with the valves operated on the side instead of over the camshaft. Only one camshaft is used, that being a vertical shaft actuated through a pair of worm gears. The main changes in transmission mechanism comprise much larger brake bands and adjustable ball bearings at the outside of the transmission gear housing and a similar adjustable ball bearing suspended from the frame side, thus dividing the chain pull between these bearings. Mechanical force-feed oilers are used, superseding the pressure feed which is used in 1907. Wheels on both models are considerably enlarged in size, those on the four-cylinder cars now being 36 inches in diameter, with 4-inch tires, and those on the two-cylinder cars 34 inches in diameter, with 4-inch tires. The two-cylinder models are also provided with the new steering wheel and motor control levers. The new roadster model 34 A is entirely different from anything heretofore built in the Rambler factory, being the prevalent racytype, three-passenger body on the model 34 chassis.

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Peerless, Peerless Motor Car Co.—The Peerless cars for the season of 1908 are higher-powered, larger, roomier and much more comfortable in riding qualities. They are characterized by few changes as compared with previous models, the principal changes being: A longer wheelbase, seven-passenger body, location of front axle further front, 36-inch wheels, flat springs and a double ignition system, including an imported Eiseman magneto. Our principal car, namely, the 30-horsepower, is now known as our model 18. The wheelbase is 118 inches. Cylinder dimensions are increased to 4⅞ by 5½ inches, and tires increased to 36 by 4 inches front and 36 by 4½ inches rear. The construction of the cylinders is changed so that the plates on the waterjacket are very much larger, permitting the easy removal of core sand and quicker accessibility in case of stoppage in the circulating system. Valves are changed from the old type of flat seated, allowing quicker intake and exhaust of the gases, making the motor pick up very much faster. The motor is equipped with a compression relief, the same not being included in the equipment last year. Wiring is much shortened, and we now have a bar arranged which precludes the possibility of any short-circuiting, or any disarrangement by carelessness in having the wires properly coupled up. The magneto is so arranged it can be removed with one thumb-screw. The lubricating oil capacity has been greatly increased and the mechanical oiler moved up to the dash. However, the oil can be drawn direct from the oil tank which is located alongside of the frame right inside the crankcase by a simple contrivance. The water circulation is unchanged with the exception of the radiator, which is of a new design. The fan is now bevel gear-driven with a friction clutch, doing away with the possibility of breakage. The rear axle is very much heavier, to take care of the increased size and weight of the motor, the clutch plates and live axle being this year constructed out of one piece of Carpenter steel. The distance rods on the frame have been changed from the pin type to the more up-to-date ball and socket type, which does away with practically all wear. The connecting rod between the steering knuckles has been placed behind the front axle instead of in front. Springs are made very much flatter, both front and rear, which makes the car very much easier riding, and the springs are fitted with bronze bushings. The fender design has been changed to afford greater protection to the car and its occupants, the rear fender this year being built with a fin arrangement which makes it much stronger. This car has always been a five-passenger car up to the present year, but now extra folding seats are included.

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Mitchell, Mitchell Motor Car Co.—The success of the Mitchell cars in 1906 and 1907 has been so satisfactory that there did not seem to be need for any vital changes. The 1908 changes take the form almost exclusively of betterments. These changes include an increase of the wheelbase of each passenger chassis; the touring car from 108 inches in 1907 to 112 inches in 1908 and the runabout chassis from a 90-inch wheel base in 1907 to 92 inches in 1908. All the brake drum diameters are increased, the touring car brake drum from 10½ inches in 1907 to 14 inches in diameter in 1908 and the runabout brake drum from 9 inches in 1907 to 10½ inches in 1908. The Mitchell car in 1908 uses rear hub drum brakes only, both external and internal. The brakes have sufficient surface to hold the cars securely with a very light pressure, due to changes not only in the brake drums but in rearrangement of the connections. A vital change has been made in axles for 1908. The manganese bronze front axle of 1907 has been changed to an I-section drop forged steel axle of the very best material to be had. The rear axle for 1908 is the same as the one used in the latter part of 1907. All of the Mitchell axles are designed by the supervising engineer of the Mitchell factory, J. W. Bate, and are manufactured in the Mitchell factory. A very vital change in the axle for 1908 allows a drop of the chassis frame of over 2 inches while still maintaining the same road clearance of 1907. Another change is the improvement and enlarging of the springs. The

1907 springs were all 1¾ inch wide, except the touring car rear springs and none was banded. For 1908 all springs are made 2 inches wide, all are banded and none of them is pierced with center holes. The runabout springs have increased to 44 inches in length and the touring car to 48 inches in the rear. Moreover, a much higher grade of material, the best that the American spring makers can furnish, is used in the 1908 cars. The 1907 universal joints were uncovered. For 1908 all universal joints will be enclosed in a dust-proof combined steel and leather casing. The same improvement in higher grade material is shown in the use of chrome nickel steel in all of the working parts of the rear axle and transmission. The motor camshaft diameter has been increased from ¾ inch to ⅞ inch and the cam face width has been doubled and is now 1 inch.

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Packard, Packard Motor Car Co.—The 1908 Packard is the development of the 1907 model just the same as the latter is a development of the preceding one. Such essential Packard features as the unit transmission and final drive in a rigid rear axle casing; expanding clutch; ignition by Eisemann low-tension magneto, with storage battery for reserve; lubrication by splash, with a simple pump feed to the crankcase; heating the carbureter by the circulation of warm water, etc., have been retained. The wheelbase of the car has been increased to 123½ inches. The wheels have been increased in diameter to 36 inches, but the body of the car has not been raised. The frame is arched from the rear axle to allow plenty of spring action and the sides of the rear seat panels have been recessed to allow a wide body, which, at the same time, sets well down between the wheels. The clutch has been slightly changed to insure easy engagement.

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Apperson, Apperson Brothers Automobile Co.—The changes in the 1908 model K Apperson touring car, as contrasted with the 1907 55-horsepower machine are very few. For the bearings previously used Timken roller bearings have been substituted; 34-inch wheels have given place to 36-inch, and new style auxiliary seats installed in the seven-passenger car. Equipment includes the top, and the price has been reduced $500. Two new cars have been added to the line. Model S is a six-cylinder seven-passenger touring car. The engine is 55 horsepower and the cylinders individually cast. The power plant is remarkably condensed and occupies only 2½ inches more space under the hood than does the 55-horsepower four-cylinder engine. There is a difference of only 1 inch in the area of the cylinder displacement of the four and six 55-horsepower engines. The chassis of models K and S are the same. Model M, the four-cylinder 30-35 horsepower, is the first Apperson car to be regularly built with a shaft-drive. It has the floating type of rear axle; ball bearings throughout; three-speed sliding gear selective type of transmission, instead of four-speed; commutator on the half-time shaft instead of on the dash; timing gears encased; double system of jump spark ignition; 34-inch wheels; 106½-inch wheelbase, and a four-passenger roadster body with individual bucket seats.

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Stoddard-Dayton, Dayton Motor Car Co.—Changes in the Stoddard-Dayton '08 models over '07 are as follows: The touring car wheelbase is 8 inches longer; the frame hangs 3 inches lower without changing the road clearance; the motor is an entirely new design of the valve in the head type with rocker arms; this is 45 horsepower instead of 30 horsepower, as last year; installing two distinct and separate systems of ignition, using the imported Sims-Bosch magneto, with two sets of spark plugs; the transmission is changed by installing two Timken roller bearings on the other end of the pocket gear, and a stub steel roller bearing inside of the pocket gear surrounding the round end of the transmission shaft; the brakes have been taken off of the transmission and both the foot brakes and emergency brakes are on the rear wheels, using both internal and external brakes on the rear hub, greatly increased in size; both have camel's-hair facing; the driving shaft hub flange is made a part of the driving shaft instead of a separate piece, as in last year's; the oiling system is by a pump in the crankcase of the engine pumping oil direct to the bearings without splash lubrication and either oil reservoir below the crankshaft case, the oil system being supplied by a gauge on the dashboard, indicating the flow of oil. The air-pressure system is supplied in connection with the gasoline tank; the body is enlarged to care for seven passengers, as against five last year. The above features pertain to both the touring car and the '08 K roadster.

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Pope-Toledo, Pope Motor Car Co.—In the 1908 Pope-Toledo the wheel base has been increased from 115 to 124 inches. The chains on our 1908 model are enclosed and run in a chain cover filled with hard grease. The body is built on square lines, while the 1907 is built on the old round form, used by the Pope people for years. The motor has a double ignition system, including magneto and four spark coils leading individually to two sets of spark plugs. The motor has a larger water-carrying space and individual spring for exhaust valve.

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Columbia, Electric Vehicle Co.—Our 1908 model 66-3 gasoline car, succeeding the 1907 mark 49, embodies a very great number of changes. The engine is ½ inch larger in bore and stroke, using a rocker arm valve motion in place of pulldown straps, an added Geinola high tension magneto with single coil distributor, direct electric transmission supplanting the gears, the shaft drive supplanting the chain, a semi-elliptic spring supplants the full elliptic. The 48-2, succeeding the mark 48, has only a few changes, which consist of Hess-Bright transmission bearings, timing gears inclosed and running in oil, cylinders of new design and ¼ inch larger in bore and stroke.

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Premier, Premier Motor Car Mfg. Co.—The Premier line for the coming year has had an addition to it in the form of a six-cylinder car and a four-cylinder car, larger than the model 24 which it has built for the past year and which will be continued during the coming year. The six-cylinder car bears the distinction of being the only car built in America whose engine with this number of units is equipped with both high-tension jump spark and low-tension make-and-break. It has a very effective multiple disk clutch thoroughly enclosed in an oil-tight housing and a clutch-drive rear axle different from anything yet applied to a motor car, and which avoids all possibility of such troubles as are usually encountered with the conventional type of either keying the wheels onto the axle or driving against a hub cap as is the case with floating type of axle. The braking surface on the Premier car is said to be larger than that employed effectively on any other car. What is true of the six-cylinder car is also true of the four-cylinder of the newer type, as these cars are built of the same units throughout. The frame flanges on these cars are unusually wide as also are the springs. All spring shackles and other moving parts of the car are amply lubricated by grease or oil cups. The motor, transmission and their connecting parts are carried on a straight-line pressed steel subframe and a steel pan extends under the car from the radiator back to the central cross-girt. The spark is controlled by a lever on the steering column and advance of the spark is had by a longitudinal movement of the intake camshaft, each ignition system being capable of independent adjustment.

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Franklin, H. H. Franklin Mfg. Co.—The most distinctive improvement of the 1908 Franklin cars over the 1907 models is the increase of power, due to the new concentric valve. This valve, now used for the first time in motor car engineering, is a combination of the exhaust and intake valves, one inside of the other. By admitting a large charge of gas quickly it increases the power without adding a pound to the weight of the engine. The concentric valve makes possible the use of a dome-shaped cylinder head, which insures better combustion and aids in

cooling the cylinder. The carbureter has been considerably improved. The shut-off valve in the float chamber is now constructed so that the danger of flooding is reduced to a minimum. The timer is so designed that the roller runs continuously on a path of hardened steel segments, separated by air-gaps, instead of on a path of steel and fiber as is commonly the practice. This gives a timer which is practically non-wearoutable and which needs no adjustment. The throttle and spark are operated by a very sensitive yet strong controlling device at the top of the steering wheel, which make the control easier than in the 1907 models.

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Austin, Austin Automobile Co.—We are now making a leader of our six-cylinder models. Our most important body changes have been the fitting of a detachable limousine top to our standard touring car body, and our new roadster body, which can be very quickly changed from a light five-pasenger touring car to a three-passenger runabout with a rumble seat of the latest design. The wheelbase of both the four and six-cylinder cars has been increased. A special type pressed nickel chrome steel frame and new type multiple disk clutch are used. Also there are a new aluminum engine base with separate oil compartment, all engine gears therein running in a bath of very heavy transmission oil, a distinctively new feature; a new water pump on the extension of the magneto shaft with special equalizing connections on each side; a new method of changing the magneto timing very quickly and easily; an entirely new type of rear brakes which are exceedingly large, powerful and durable; much larger universal joints and driving shaft and a new double carbureter which is perfectly adjusted to all speeds, giving perfect satisfaction.

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Moline, Moline Automobile Co.—Moline cars during the season of 1907 proved so entirely satisfactory that it has not been deemed necessary by the manufacturers to make any radical changes in their construction. The two-cylinder car has had such a successful run that the machine is to be put out for 1908 exactly the same as was shown for 1907. In the four-cylinder models a new type of valve push rod has been substituted. This new push rod is considerably larger than was formerly used, furnishing greater wearing area. In addition to this it is fitted with an adjustment at the upper end whereby the possibility of noise from lost motion between the push rod and the valve stem is entirely eliminated. The general appearance of the car has been very materially improved by equipping with the folding type of hood, and brass radiator with external filler cap. Another feature of the 1908 model cars is in the new style of fender. These are of the square sweeping type and are finished to match the body of the car.

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White, White Co.—The White Co. is equipping its 1908 models with its new thermostat arrangement. This thermostat is now in the steam line under the footboard and in connection with it there is a temperature gauge in sight of the driver, which gives the temperature of the steam at all times. In this very accessible place under the footboard both the thermostat rod and pin are adjustable, and the whole may be removed and a new one replaced in a very few moments. The main bearings in the 1908 cars are treated to a special depth of ¼-inch. These balls now run in a cup on both sides instead of a flat surface on one side. The wheelbase of the model K car has been increased to 122 inches without increasing the body length; the rear springs have been lengthened from 48 to 54 inches; the engine has been lowered to such an extent that the driving shaft has been brought to an almost horizontal position, reducing the wear on the universal joints. In the model L cars the steam generator is larger. This increase in size has been gained not by giving it an increased height or diameter, but by using the same sized generator tubing as is used in the model K, thereby increasing the steaming capacity. The wheelbase and rear springs have been increased 2 inches. This model is also equipped with the new thermostat arrangement.

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Gearless, Gearless Transmission Co.—One of the surest indications of the proven worth of Gearless cars lies in the fact that no radical differences will appear in the 1908 models. We have added a new member to the Gearless family, the model Sixty 60-horsepower four-cylinder Gearless Greyhound. With the exception of a minor change in the appearance of the dash, Gearless cars remain as heretofore, embodying the same mechanical advantages and handsome distinctive lines that always have stamped them as the greatest proposition on wheels.

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Matheson, Palmer & Singer Mfg. Co.—The wheelbase of the 1908 car is 128 inches instead of 123 inches. The gas tank is of different shape and is higher from the ground and because of a by-pass which can be opened or closed it always has a reserve of 5 gallons of gasoline. The muffler cut-out instead of acting on the muffler works on the exhaust pipe. The chains are much shorter and the radius shaft much stronger. The 2-foot brakes instead of being bronze cork-lined, are now of Raymond brake steel, lined with asbestos and fiber. The adjustment also is much simpler. On the transmission the fourth or direct drive, instead of being actuated by dogs, is now an internal gear. The different rods for shifting gears are all incased, protected thereby from dust, oil, etc. The gears are now locked. The quadrant is much shorter and the driver is therefore able to work his change speed lever and his emergency brake lever without having to reach as far as he was obliged to do in the 1907 model. The reserve oiler contains now 2½ gallons instead of 1 gallon. The McCord oiler attached to the dashboard has been replaced by one manufactured by Manzel Brothers. This new oiler works on the same principle, but all the oilers and regulating screws are incased. On the clutch pedal there is a little catch to prevent the foot from slipping. The steering rod arms are stronger and because of a slight difference in the design the steering is much more precise, notwithstanding the fact that the wheelbase has been increased. The stem of the steering wheel is pitched at a sharper angle and is adjustable to any angle. The two-to-one shaft is straight and is actuated by a spiral gear instead of bevel gear as formerly. The water pump, instead of being centrifugal, is now a gear pump. The front sprockets instead of having seven leaves now have fourteen. Beneath the chassis there is an adjustable truss. The magneto driving shaft has two universal joints.

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American, American Motor Car Sales Co.—The 1908 American differs from the '07 in that it has a 50-60-horsepower motor instead of 40, 6 inches longer wheelbase, four-speed selective transmission instead of three-speed progressive, and a much better spring suspension. The '08 American touring car has a 50-60-horsepower motor instead of 40; has 8 inches longer wheelbase, a four-speed selective transmission and carries seven passengers.

De Luxe, De Luxe Motor Car Co.—The changes in the 1908 Car De Luxe might better be termed refinements than departures. They represent the natural evolution of the industry, which is to say the Car De Luxe for 1908 is not lacking, even in the smallest details, the points demanded in a high-priced four-cylinder car by the buying public. The changes referred to consist of the following: Internal and external metal-to-metal brakes of the shoe type on the rear wheels, which eliminates the brakes located in front and in rear of the transmission on 1907 models. Instead of the single system of ignition used in 1907, a dual system has been substituted, consisting of a gear-driven Eisemann magneto, gear-driven commutator, coil and battery. In place of 3½-inch front and 4½-inch rear tires 4-inch front and 5-inch rear are now used. Lemoine three-point suspension rear springs take the place of the individual side semi-elliptics, and add materially to the riding qualities of the

car. Instead of the 1907 leather-faced cone clutch, a metal-to-metal clutch with cork inserts is now used. This change makes it possible to release the clutch with considerably less effort than on former models. The above constitute the mechanical refinements for 1908 with the exception of an automatic mechanical device for perpetually maintaining a correct level of oil in the crankcase. The generator lines of the body remain the same, but the tonneau has been widened and lengthened to provide for a tonneau seat of greater width and depth. The gasoline tank will now be located under the front seat and holds 20 gallons. The emergency seats are very roomy and comfortable and may be swung against the side of the body.

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Duer, Chicago Coach and Carriage Co.—The only new thing we have to offer is the four-cylinder motor, which we have made interchangeable with our present two-cylinder.

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Pierce-Racine, Pierce Engine Co.—The difference between Pierce-Racine cars for 1908 and 1907 models is that in the former the model D has an increase of 5 horsepower, a stronger rear axle, larger and more efficient brakes and triple-action springs. Model E is a new car, a four-cylinder water-cooled 30-35-horsepower machine with 32 by 4-inch tires, 106-inch wheelbase, five-passenger, straight-line body.

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Haynes, Haynes Automobile Co.—What has been considered right in mechanical engineering for years has been introduced in the new Haynes. This is the use of two flywheels, one at each end of the crankshaft, weighing 50 and 125 pounds, respectively. In the conventional motor with one flywheel on the rear end, the entire work of the crankshaft is done from that end and the forward end is left free to drive the camshaft and perhaps the magneto, oil and water pumps. Using the forward flywheel holds that end of the shaft steadier, eases the work on the motor in general and reduces what has come to be called the whip of the crankshaft. Abroad the French Motobloc has used a flywheel between the double-cylinder castings and in America scores of makers have said that the double flywheel is right. Another very important improvement is the housing of the mechanical oiler in the motor-supporting arms on either side of the motor, holding 2¼ gallons of oil, making a clean-cut appearance of the motor and adding materially to the cause of accessibility. On the model U we have increased the wheelbase to 118 inches.

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Corbin, Corbin Motor Vehicle Corporation—Aside from the general refinements throughout and increased power, our cylinders being ¼-inch larger bore, our 1908 air-cooled model has very few changes over the '07. We are marketing for the first time a water-cooled Corbin car which in mechanical details is similar to our air-cooled car, except in the motor. The size of the motor is the same as the air-cooled. We have three models for 1908, a five-passenger touring car, four-passenger runabout, the two rear seats of which can be detached at pleasure and a rumble seat attached, and a roadster which seats two. This last is equipped with a special racing body.

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Studebaker, Studebaker Brothers Mfg. Co.—Our 1908 car is built on the same general lines as the 1907. It is a 40-horsepower, carries seven passengers, has selective transmission, four speeds, with direct drive on third.

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Winton, Winton Motor Carriage Co.—Inasmuch as the Winton Six-Teen-Six is a six-cylinder model of completely original design and not a four-cylinder with two additional cylinders annexed, it differs in so many respects from the 1907 cars that to point out the differences would require catalogue space. It would be easier to point out features of relationship. The six frame, though lengthened, is of the same general design, springs are similar, the floating rear axle and the manganese bronze front axle are continued in use, as is also the multiple disk clutch, though in detail this, too, has been improved. Accessibility features have been retained and augmented. Valves are continued on one side with a single camshaft. The body design is new; ignition is by magneto, as against batteries; mechanical oiling is continued, but the oil is filtered and reused; cylinders are offset as before; the transmission is the same as in 1907 except that the six requires only three forward speeds, whereas four were used on the Winton model M. The carbureter is of the former Winton design, improved in detail, and the carbureter manifold is necessarily different in design. This gives an idea of Winton construction for 1908.

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Auburn, Auburn Automobile Co.—The 1908 Auburn five-passenger touring car, 24 horsepower, shows an attention to detail and presents more of a finished, dressed-up appearance than the 1907 model. The body is of the straight-line design, the painting of the body and gear being a bronze green. There is considerable more room in the rear seat; the frame is considerable heavier; the radiator larger and conical in shape; the reverse and low speed ahead are on pedals; there is a brass pedal plate and ratchet brake attachment; the front fenders are closed; the steering post has more of a rake with friction control on top of the steering column; the toolbox is on the running board; there is a metal pan; the oiler is larger and belt-driven by a wire spring belt; a number of minor improvements have been made in transmission and motor.

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Great Smith, Smith Motor Car Co.—The 1908 Great Smith touring car is 2 inches longer in the wheelbase, 2 inches deeper, 4½ inches from the tonneau; the doors are 1½ inches wider; the brakes are about four times the capacity, and in place of being pressed into engagement, they are drawn, there being cone clutches upon each rear wheel. The matters of refinement are carried out much more completely than they have ever been before. The steering wheel is upon a stationary staff, with a stationary sector above it, in place of the telescoping one of last year. The front end of the squared shaft is now placed upon a roller bearing, which enlarges the size of the transmission-supporting ball on the front of the transmission. It is the new Great Smith roadster, in which the same mechanical changes have been made in the machinery that have been mentioned above, that is, the brakes, transmission, etc.; but the body is entirely new. The wheelbase is 110 inches and the wheels 36 inches, with 4-inch tires both front and rear. The chassis is built for a roadster only, and it is not a converted touring car in any sense of the word. Full elliptic springs are used throughout, and the seats are more comfortable than roadsters generally are supplied with. At the same time, the car is very snappy and stylish. The regular equipment seats, one ramble seat upon the tool box behind; but an extra one can be furnished if desired.

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Holsman, Holsman Automobile Co.—The spark advance mechanism is now made with large teeth similar to the cam gear teeth to prevent wear, and the pawl points are made correspondingly large to fit. There is therefore no possibility of wear on either of these parts sufficient to cause the pawl to fail to take hold and retard or advance the spark properly. The steel rims in which the cables run have been improved and deepened. This does away entirely with the cables jumping off. New-style reverse pulleys engage the sides of the steel channels on the rear wheels. These are so powerful that the vehicle can often be reversed where it is impossible to go forward on the low gear. Improved spring sprocket wheels greatly increase the life of the driving chains. Chain cables made up of strong chains wrapped with webbing are flexible and do not change in length. Main

crankshaft bearings have been designed so that the old bearings can be removed and new bearings inserted without lifting the crankshaft out of the motor. The steering mechanism has been improved and strengthened and nothing but drop forgings are used in this place. Many minor improvements have been made which would be difficult to describe in so short a space. Our 1908 models are already on the market, and the new features are meeting with great favor.

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Pierce-Arrow, George N. Pierce Co.—The new Pierces differ from the old in the following manner: Motor supports use drop forgings in place of manganese bronze; the valve gear piston is on the crankshaft, keyed and pinned on instead of being pinned only; valve lifters are made adjustable; the gudgeon pin and small end bearings of the connecting rod are larger in diameter; the magneto is fixed on by means of a clamp that admits of instant removal; the front hubs are made from a steel stamping instead of steel casting; front shock absorbers are fixed on by means of a bracket under the two clip bolts instead of being attached to one clip bolt; there are spring washers under the nuts of all clip bolts to prevent nuts slacking off; the steering lever on the bottom of the column is fixed on with a taper square, so it can be tightened up if it comes loose; the dust pan under the motor is made dust and mud-proof, all holes in the same being covered up; the oil cups for spring ends have revolving caps instead of spring covers; the magneto distributor gears are made of metal instead of fiber, thus doing away with the strippings of the same; there are Yale locks for dash cabinets, front and rear heel boards, rear tool box and hood over motor, all being opened by one key; the hood over the motor, closing down directly on to the sideboard of the underframe, does away with the wood sills from dash to radiator.

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Stearns, F. B. Stearns Co.—The 1908 Stearns, four-cylinder type, differs in that it has a Mercedes type radiator, the circulating pump is cast in the left hand front motor support, and is removable without taking off the radiator. The force feed oiler is cast in the right hand front motor support. The magneto is a direct drive from the oiler shaft, and is detachable and without bolts; the low tension timer is vertical-driven from the oiler shaft. Waterjackets around the cylinders have hand holes for cleaning; the fan adjustment is by eccentric shaft; there are ball bearing steering knuckles, ball bearing steering post, hard rubber steering wheel and hand throttle control spark lever on top of wheel; there is an auxiliary gasoline tank on the dash in front of the driver and a pressure air system with a catch trap for moisture and dirt; foot and running boards are of cork linoleum, brass-trimmed; the clutch and clutch arbor can be removed by taking out the bolts from the flange coupling on the arbor shaft; the clutch is independent of the emergency brake, reducing the number of parts; the rear spring is 6 inches longer; there is a 2-inch drop in the frame in the rear, giving 2 inches more opening to the springs; the wheels are dished ⅝ inch; the bodies are pressed steel; the front axle is heavier in some portions; the power plant is assembled in one unit, including the radiator and steering gear, entirely independent of the chassis; the radiator rests on the front part of motor frame; there are 36 by 3½-inch tires in front and an equalizing cable on the emergency brake. In the six-cylinder model there is a 128-inch wheelbase with the same general lines and the same cylinder castings, bore and stroke as on the four. There is a heavier front axle and 36 by 4-inch tires in front.

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National, National Motor Vehicle Co.—There is no practical difference between the model H 1907 National and the model K 1908 National with the exception of an option of platform springs on the rear. The round hood, dash and round line body will be continued. The model L 1907 six-cylinder National will continue the same round line body with addition of platform springs and will give an option of a square hood and square dash or the standard model round dash and round hood which have been for years National features. In addition two new models are added to the line, a model N four-cylinder with straight line body, straight dash and square hood and with ⅛-inch large engine and a Simms-Bosch magneto and a model R six-cylinder which has a smaller motor and has the cylinders cast in pairs. It is furnished exclusively with a straight line body, square hood and square dash.

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Royal Tourist, Royal Motor Car Co.—Changes in our 1908 model from the 1907 model are as follows: Platform rear spring suspension, 36-inch wheels instead of the 34-inch, larger valves, four piston rings in place of three, and the yoke style of attachment on the frame for the strut rods.

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Marmon, Nordyke & Marmon Co.—The Marmon model G air-cooled 40-horsepower touring car has only two points much different from the 1907 model of the same type, viz., the new detachable head cylinder, which does away with valve cages and is an improvement in power, speed and coolability, and the adoption of an up-to-date straight-line sheet aluminum body. A solid cast aluminum body is also furnished for this model if preferred. The model H 45-horsepower touring car has a 5 by 5-inch four-cylinder water-cooled motor, designed particularly with a view to smooth running qualities and long life. It has large shaft and bearings, long connecting rods and long pistons, large valves and the Marmon system of automatic lubrication. The intake is greatly simplified and waterjacketed. It is an exceedingly quiet motor and very flexible. The studs which hold the cylinders to the crankcase also hold the caps of the main bearings, thus tying the cylinders and shaft together with steel, relieving the crankcase from strains to a remarkable extent. The motor embodies the very best ideas of foreign and domestic construction. The clutch is multiple disk, with cork inserts running in oil. The transmission is selective, with automatic interlocking device, and automatic brake to slow down the gears and clutch. The Marmon double three-point suspension is used, but in this model the rear end single pivotal bearing is supported from a cross member of the body frame instead of being carried back on the rear axle as heretofore. Seven-passenger cast aluminum body and Marmon roller bearing steering column are also distinctive features of the new models.

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Pungs-Finch, Pungs-Finch Auto and Gas Engine Co.—The only change we made in our model H standard car was to increase the size of the cylinders from 4½-inch bore to 4¾ inches. Otherwise this car is identical with our last year's car, as we found nothing to improve. Our model 35 runabout has been changed in the body only. We are now making two styles of bodies, one with a disappearing seat and the other with the rumble seat, the chassis being identically the same as last year. We have standardized all our parts and intend to continue manufacturing on these lines.

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Stevens-Duryea, Stevens-Duryea Co.—The new four-cylinder car for 1908 is vitally different from the present four-cylinder machine made by this company. We have a 124-inch wheel base, 30 by 34 wheels, front axle under the radiator, platform cross spring on the back, while the cylinders are cast in pairs instead of singly as hertofore. The timing gears are back of the engine instead of in front as in former years. The cylinders are 4¾ by 4½ inches instead of 3¾ by 4½ inches. The oiler is now under the bonnet instead of on the dashboard. It has a floating type of rear axle and the brakes are much larger. Both the regular and emergency brakes are on the rear wheels and a foot accelerator is furnished. The space between the dashboard and the frame is covered, making an effective protection against mud and dust. These are some of the main features in the difference between the construction of the present four-cylinder

car and the new model and touches only on this type of a machine manufactured by the Stevens-Duryea. The six-cylinder Stevens-Duryea cars for 1908, both large and small models, will remain in every respect the same as a 1907. It has been the policy to continue models from year to year, and this has been followed out in the sixes.

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Babcock, Babcock Electric Carriage Co.—The changes in Babcock electrics are improved motor control and new type of bodies. The company believes it has a standard article and therefore has aimed at refinements rather than any radical ideas in construction.

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Staver, Staver Carriage Co.—Among the changes which we have made in the model D over our 1907 car are that we have changed our spring suspension, using full elliptic springs in the rear instead of half elliptic. Our wheel base is 7 inches longer than in 1907. Our engine is 5 by 5 inches instead of 5 by 4½ inches. We are using a mechanical lubricator instead of compression feet, 1½-inch solid tires in the rear instead of 1⅜, an improved planetary transmission with the high speed clutch of the multiple disk type lined with gray fiber and a radiator of the honeycomb type in front of the hood, doing away with an extra water tank. We have a fan behind our radiator, which has a shaft drive running direct back, with a friction pulley against the flywheel. Our water pump is gear-driven instead of chain-driven. We are using our own design of timer, consisting of three-ball contact, and the same is keyed straight through the camshaft instead of being fastened with setscrews.

* * *

Jackson, Jackson Automobile Co.—The Jackson model C is fitted with a square dash and oval hood in place of the square hood and round dash. Otherwise it is practically the same. The model D is turned out in two models, one having the same planetary transmission as last year with a new straight line body. The other has a new selective type of transmission and straight line body. In addition two new models are added, a shaft-drive two-cylinder runabout and a four-cylinder 30-horsepower car.

* * *

Kisselkar, Kissel Motor Co.—The improvements in the Kisselkar for 1908 over 1907 are in the nature of refinements. The motor has been increased in size from 4½ by 4½ to 4¾ by 4¾ inches. There is an I-beam section front axle in place of a tubular one; 34-inch wheels instead of 32-inch; 52-inch rear springs instead of 42-inch; straight-line body; enclosed guards and running boards; Hartford universal drivingshaft and knuckles; 108-inch wheelbase in place of 98-inch; choice of magnetos or storage batteries; choice of three bodies, limousine, touring or runabout; tire equipment 34 by 4 inches; extra seats for touring, making seven-passenger car, and larger brakes.

* * *

Tincher, Tincher Motor Car Co.—We have made no change over our 1907 model with the exception of some minor refinements. We have given the matter of material and workmanship special attention and we are using Krupp's nickel chrome steel in all our forgings, importing the forgings direct from the Krupp plant at Essen, Germany. Whereas we used open-hearth forgings in our 1907 product, we are using a nickel chrome steel frame, heat-treated. Our ignition system is Gianoli high-tension magneto and battery, both connected up to one set of plugs; current switched from magneto to battery through high-tension switch on the dash.

* * *

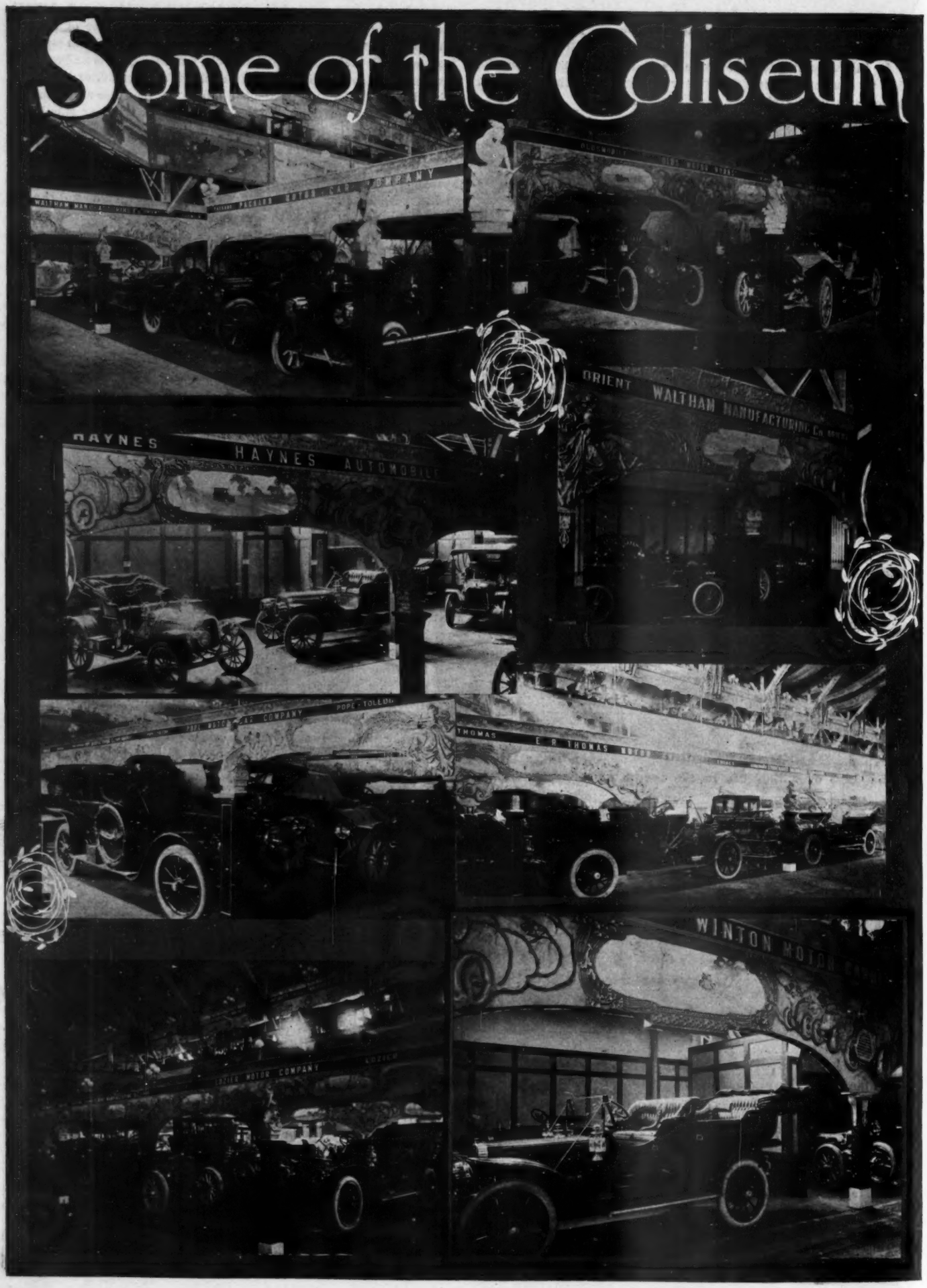
Diamond T, Diamond T Motor Car Co.—Probably the greatest improvement made on the new models and particularly on the roadster is setting the car lower down between the wheels, giving a lower center of gravity and steadier riding qualities. Particular attention has been given to the luggage-carrying capacity on the roadster as this car is designed for cross-country touring as well as speed. The front fenders are hinged at the running boards and the forgings set in sockets on the frame. This allows the fender to be lifted up out of the way and gives easy access to the motor. The braking system is also new, as both internal and external brakes on the rear wheels are connected to a small evener attached to each end of one main evener. This causes either the foot or emergency brake to apply the drag equally on both wheels, doing away with the tendency to skid. Both brakes being used all the time make the wear less on either and also equal on both, so that this necessary feature of a car is longer lived and the condition of both brakes known at all times. The trunk and 25-gallon tank being set behind the seats give weight aft to hold the car down and make easier riding. With a large tank in the rear we do away with pressure feed, which we think is objectionable at all times.

FACTS ABOUT CHICAGO SHOW TOLD BY THE STATISTICIAN

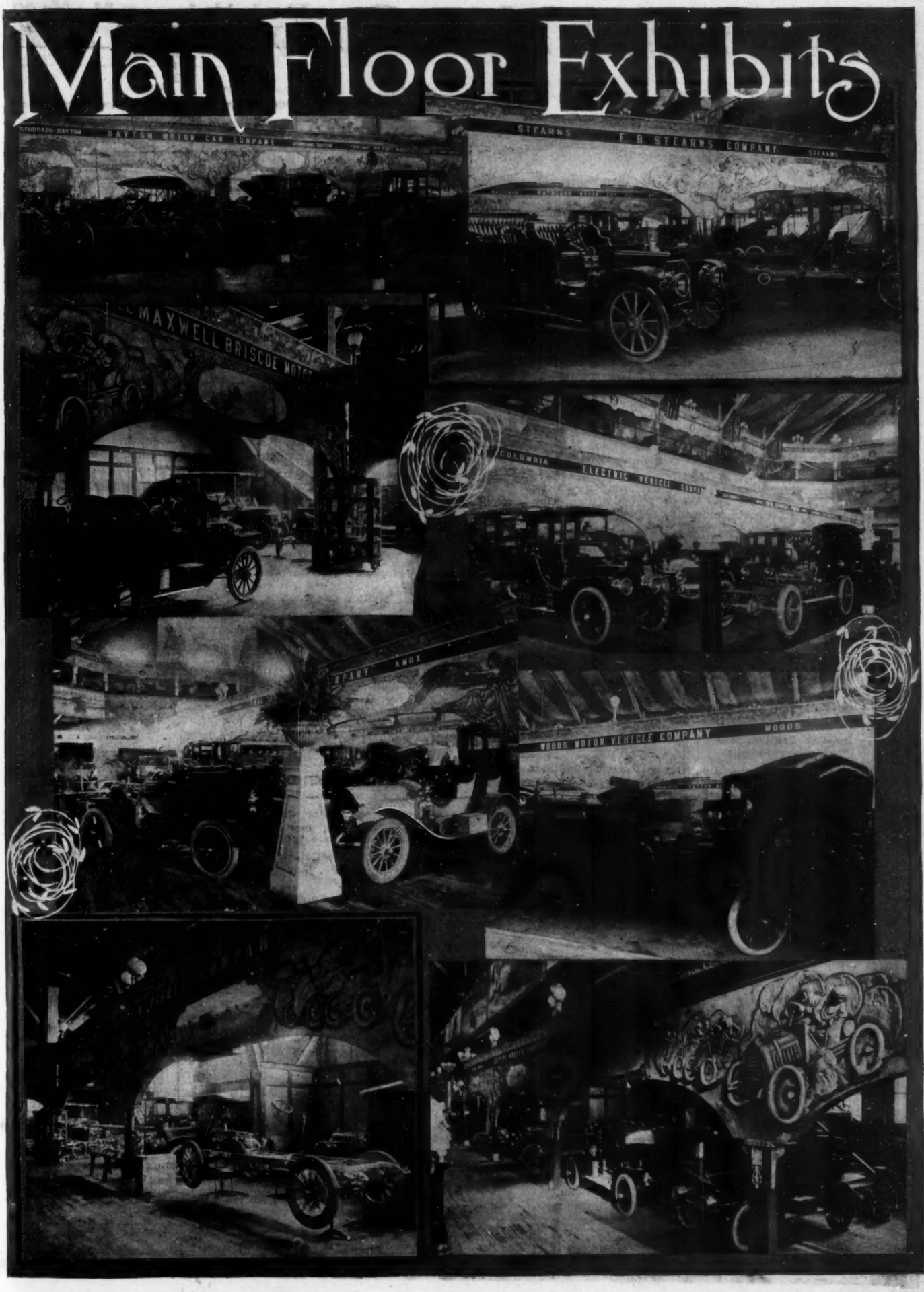
	1906	Spring 1907	Fall 1907
Total number of vehicles exhibited, including pleasure rigs, chassis, electrics and commercial wagons	366	359	410
Gasoline cars	222	249	262
Gasoline chassis	67	67	55
Foreign pleasure cars	11	10	...
Domestic pleasure cars	211	230	297
Gasoline commercial cars	20	9	33
Foreign chassis	9	3	1
Domestic chassis	59	64	5
Double chain drive	90	63	86
Single chain drive	46	23	13
Shaft drive	171	219	224
Friction drive with double side chains	9	12	13
Rope drive	2	2	5
Runabouts	37	66	84
Touring cars	141	129	118
Limousines	34	42	38
Landaulets	4	6	5

	1906	Spring 1907	Fall 1907
Miscellaneous, including motor buggies	6	1	13
Air-cooled	42	44	44
Water-cooled	267	275	306
One cylinder, vertical	1	2	...
Two cylinder, vertical	14	1	7
Three cylinder, vertical	3	2	3
Four cylinder, vertical	208	241	227
Six cylinder, vertical	6	14	39
One cylinder, horizontal	12	10	3
Two cylinder, horizontal	55	41	71
Four cylinder, horizontal	1	0	0
Miscellaneous	9	8	2
Electric pleasure cars	34	36	35
Electric commercial cars	8	1	20
Electric chain drive	22	21	41
Electric gear drive	17	15	9
Electric shaft drive	3	3	3
Steam cars	7	4	5
Steam chassis	1	0	0

A. M. C. M. A. show, New York, 170 cars A. L. A. M. show, New York, 134 cars Olympia show, London, 560 cars


Some of the Coliseum
HAYNES AUTOMOBILE
ORIENT WALTHAM MANUFACTURING
POPE-TOLEDO
THOMAS E R THOMAS
WINTON

Main Floor Exhibits



Directory of the Motor Car Exhibitors

Acme Motor Car Co., Reading, Pa.—Acme
One touring car, one limousine

Aerocar Co., Detroit, Mich.—Aerocar
Two touring cars, one roadster

American Locomotive Automobile Co., Providence, R. I.—Berliet
One chassis, one town car, one limousine, one touring car, one runabout

Apperson Brothers Automobile Co., Kokomo, Ind.—Apperson
Two touring cars, two runabouts, one landaulet, one Apperson Jackrabbit

Atlas Motor Car Co., Springfield, Mass.—Atlas
One runabout, one roadster

Auburn Automobile Co., Auburn Ind.—Auburn
One chassis, one roadster, two touring cars

Aurora Motor Works, Aurora, Ill.—Aurora
One chassis, one runabout

Austin Automobile Co., Grand Rapids, Mich.—Austin
One limousine, detachable; two combination roadsters, one touring car

Autocar Co., Ardmore, Pa.—Autocar
One chassis, one touring car, one limousine, one roadster and one runabout

Babcock Electric Carriage Co., Buffalo, N. Y.—Babcock
One brougham, one coupe, one roadster, one victoria phaeton

Baker Motor Vehicle Co., Cleveland, O.—Baker
One chassis, one coupe, inside driven; one landaulet, one roadster, one Queen Victoria

Bartholomew Co., Peoria, Ill.—Glide
One touring car and one special type touring car

Black Mfg. Co., Fort Wayne, Ind.—Black
One chassis, one motor buggy

Brush Runabout Co., Detroit, Mich.—Brush
One runabout, one combination runabout and touring car

Buckeye Mfg. Co., Anderson, Ind.—Lambert
One chassis, one roadster, three touring cars

Bugmobile Co. of America, Chicago—Bugmobile
One stanhope

Buick Motor Co., Flint, Mich.—Buick
Two chassis, two touring cars, one roadster

Byrider Electric Auto Co., Cleveland, O.
One runabout

Cadillac Motor Car Co., Detroit, Mich.—Cadillac
One chassis, one coupe, one limousine, two runabouts, three touring cars

Chicago Coach and Carriage Co., Chicago—Duer
One runabout

Cleveland Motor Car Co., Cleveland, O.—Cleveland
One chassis, one roadster

Colt Runabout Co., New York City, N. Y.—Colt
One runabout

Columbus Buggy Co., Columbus, O.
Electrics—One buggy top, inside operated coupe, one victoria top Gasoline—One chassis, one runabout

Corbin Motor Vehicle Corporation, New Britain, Conn.—Corbin
One chassis, one special speedster, one tourabout, one touring car, one motor and transmission

C. V. I. Motor Car Co., Jackson, Mich.—C. V. I.
One roadster and one touring car, one motor

Dayton Motor Car Co., Dayton, O.—Stoddard-Dayton
One chassis, two limousines, one roadster, one runabout, one touring car and one type victoria

DeLuxe Motor Car Co., Detroit, Mich.—DeLuxe
One chassis, one touring car

Diamond T Motor Car Co., Chicago—Diamond T
One limousine, one roadster, one touring car

Dragon Automobile Co., Philadelphia, Pa.—Dragon
One roadster, one touring car

Electric Vehicle Co., Hartford, Conn.—Columbia
Electrics—One chassis, one electric coupe, one electric victoria, two limousines Gasoline—One runabout, one touring car

Elmore Mfg. Co., Clyde, O.—Elmore
One chassis, one roadster, two touring cars

Franklin, H. H., Mfg. Co., Syracuse, N. Y.—Franklin
One engine and transmission, one landaulet, one limousine, one roadster, one runabout, three touring cars

Gaeth Automobile Co., Cleveland, O.—Gaeth
One chassis, one touring car

Geerless Transmission Co., Rochester, N. Y.—Gearless
One chassis, one roadster, one runabout, two touring cars and Geerless Greyhound, Weston's pilot car

Halladay Motor Car Co., Streator, Ill.—Halladay
One touring car

Haynes Automobile Co., Kokomo, Ind.—Haynes
One roadster, three touring cars, reliability run roadster

Holsman Automobile Co., Chicago—Holsman
One runabout, one runabout with limousine top, one surrey

Imperial Motor Car Co., Williamsport, Pa.—Imperial
One chassis, two roadsters

Jackson Automobile Co., Jackson, Mich.—Jackson
One chassis, two roadsters, three touring cars

Thomas B. Jeffery & Co., Kenosha, Wis.—Rambler
One chassis, one roadster, two touring cars

Kissel Motor Car Co., Hartford, Wis.—Kisselkar
One chassis, one limousine, one roadster and one touring car

Knox Automobile Co., Springfield, Mass.—Knox
One chassis, one landaulet, one limousine, one runabout, one roadster, one stanhope type, two touring cars

Lauth-Juergens Motor Car Co., Chicago, Ill.—Lauth-Juergens
One motor, one touring car

Lear, Oscar, Automobile Co., Columbus, O.—Frayer-Miller
One roadster, two touring cars

Locomobile Co. of America, Bridgeport, Conn.—Locomobile
One chassis, one landaulet, one limousine, one runabout, two touring cars

Lorraine Automobile Mfg. Co., Chicago—Lorraine
One roadster, one touring car

Lozier Motor Co., New York City—Lozier
One chassis, one limousine, two touring cars, one motor

Mason Car Sales Co., Kansas City, Mo.—Mason
One chassis, one touring car

Maxwell-Briscoe Motor Co., Tarrytown, N. Y.—Maxwell
Three chassis, one limousine, one roadster, two runabouts, one touring car

Mitchell Motor Car Co., Racine, Wis.—Mitchell
One limousine, one roadster, one runabout, one touring car

Moline Automobile Co., East Moline, Ill.—Moline
Two touring cars

Monarch Motor Car Co., Chicago—Monarch
One motor, one runabout, one touring car

Moon Motor Car Co., St. Louis, Mo.—Moon
One roadster, two touring cars

National Motor Vehicle Co., Indianapolis, Ind.—National
Motor and transmission, one limousine, one roadster, three touring cars

Nordyke & Marmon Co., Indianapolis, Ind.—Marmon
One chassis, one roadster, two touring cars, crankcase showing oiling device, and roller-bearing steering column

Northern Motor Car Co., Detroit, Mich.—Northern
One chassis, one limousine, one roadster, one touring car

Oakland Motor Car Co., Pontiac, Mich.—Oakland
One motor, one roadster, one touring car

Olds Motor Works, Lansing, Mich.—Oldsmobile
One chassis, one roadster, three touring cars

Packard Motor Car Co., Detroit, Mich.—Packard
One chassis, two runabouts, one limousine, one touring car

Directory of the Motor Car Exhibitors

Palmer & Singer Mfg. Co., New York, N. Y.—Matheson
One chassis, one demi-limousine, one limousine, one touring car

Peerless Motor Car Co., Cleveland, O.—Peerless
Motor, one chassis, two limousines, one runabout, three touring cars

Perfection Auto Works, South Bend, Ind.
One roadster, one touring car

Pierce, George N., Co., Buffalo, N. Y.—Pierce-Arrow
One chassis, one limousine, three touring cars

Pierce Engine Co., Racine Junction, Wis.—Pierce-Racine
One motor, one limousine, one roadster, two touring cars

Pope Mfg. Co., Hartford, Conn.—Pope-Hartford
One roadster, two touring cars

Pope Mfg. Co., Hagerstown, Md.—Pope-Tribune
One runabout, one touring car

Pope Motor Car Co., Indianapolis, Ind.—Pope-Waverley
One inside operated chelsea, one inside operated coupe, two phaetons, one runabout, one speed runabout, one stanhope

Pope Motor Car Co., Toledo, O.—Pope-Toledo
One motor, one limousine, one runabout, three touring cars, one touring coach

Popular Price Auto Co., Harvey, Ill.
One runabout

Premier Motor Mfg. Co., Indianapolis, Ind.—Premier
One limousine, one runabout, three touring cars

Pullman Motor Car Co., Chicago—Pullman
One chassis

Pungs-Finch Auto and Gas Engine Co., Detroit, Mich.—Pungs-Finch
One runabout, one touring car

Rainier Co., New York—Rainier
One chassis, one limousine

Rauch & Lang Carriage Co., Cleveland, O.
Electrics—One chassis, three coupes, two stanhopes

Reliable Dayton Motor Car Co., Chicago—Reliable Dayton
One chassis, one runabout, one surrey

Reo Motor Car Co., Lansing, Mich.—Reo
One chassis, two roadsters, two runabouts, one touring car

Rockford Automobile and Engine Co., Rockford, Ill.
One motor buggy

Royal Motor Car Co., Cleveland, O.—Royal Tourist
One chassis, one limousine, one touring car

Schacht Mfg. Co., Cincinnati, O.—Schacht
Two runabouts

Smith Auto Co., Topeka, Kan.—Great Smith
One chassis, one runabout, one touring car body

Staver Carriage Co., Chicago, Ill.—Staver
One runabout

Stearns, F. B., Co., Cleveland, O.—Stearns
One chassis, one limousine, two runabouts, one touring car

Stevens-Duryea Co., Chippewa Falls, Mass.—Stevens-Duryea
One chassis, two limousines, three touring cars

Studebaker Automobile Co., South Bend, Ind.—Studebaker
Gasoline cars—One chassis, one limousine, one runabout, two touring cars Electric cars—One runabout, one stanhope, one victoria

Tincher Motor Car Co., South Bend, Ind.—Tincher
One chassis, two roadsters, one touring car

Thomas, E. R., Detroit Co., Detroit, Mich.—Thomas-Detroit
One chassis, one runabout, one touring car

Thomas, E. R., Motor Co., Buffalo, N. Y.—Thomas
One motor, one limousine, one town car brougham, two touring cars

Waltham Mfg. Co., Waltham, Mass.—Waltham
One democrat wagon, one roadster, two runabouts, one surrey, one touring car

Wayne Automobile Co., Detroit, Mich.—Wayne
One chassis, one roadster, one tourabout, one touring car

Wayne Works, Richmond, Ind.—Richmond
Three touring cars, transmission

Welch Motor Car Co., Pontiac, Mich.—Welch
One limousine, one touring car

White Co., Cleveland, O.—White
Two limousines, one runabout, two touring cars

Winton Motor Carriage Co., Cleveland, O.—Winton
One chassis, one limousine, one runabout, one touring car

Woods Motor Vehicle Co., Chicago—Electrics
First automobile ever exhibited at a public exhibition in Chicago, one chassis, three Queen Victorias, two Queen Victoria broughams

COMMERCIAL CARS

American Motor Truck Co., Lockport, N. Y.
One four-cylinder truck

Brush Runabout Co., Detroit, Mich.
One delivery wagon, 600-pound capacity

Commercial Motor Truck Co., Plymouth, O.—Plymouth
One 2-ton truck

Coppock Motor Car Co., Decatur, Ind.—Coppock
One-ton truck, chassis of 1-ton truck

Couple-Gear Freight Wheel Co., Grand Rapids, Mich.
Five-ton truck, 1-ton delivery wagon, chassis of 3-ton truck

Franklin, H. H., Mfg. Co., Syracuse, N. Y.
One-ton truck

Gifford-Pettit Mfg. Co., Chicago
Chassis of 3-ton truck

Knox Automobile Co., Springfield, Mass.—Knox
One 3-ton truck, one 1½-ton truck

Lambert Motor Truck Co., Anderson, Ind.
Three-ton truck

Lear, Oscar, Automobile Co., Springfield, O.—Frayer-Miller
Two-and-a-half-ton stake truck, 2½-ton delivery truck, one combination chemical and hose wagon

Meiselbach Motor Wagon Co., A. D., North Milwaukee, Wis.
Two-ton brewery wagon, one chassis of 1-ton truck

Mitchell Motor Car Co., Racine, Wis.—Mitchell
One-and-a-half-ton truck, one delivery wagon

Pittsburg Motor Vehicle Co., Pittsburg, Pa.
Electrics—Two delivery wagons, 750-pound capacity; one delivery wagon, 1,500-pound capacity

Pope Motor Car Co., Indianapolis, Ind.
Electrics—Open light delivery wagon, 1,500-pound capacity; closed light delivery wagon, 1,500-pound capacity; one truck, 2,000-pound capacity; one express wagon, 2,000-pound capacity

Rapid Motor Vehicle Co., Pontiac, Mich.—Rapid
One-ton funeral wagon, 1½-ton chassis, 1-ton delivery wagon, fifteen-passenger opera bus, twelve-passenger Pullman, one police patrol and ambulance, 1½-ton truck, twenty-passenger sightseeing car, twelve-passenger sightseeing car, sixteen-passenger bus, one buggy runabout and one chassis twelve-passenger bus used in Chicago Motor Club's reliability run

Reliance Motor Car Co., Detroit Mich.—Reliance
Three trucks

Safir Automobile Co., Zurich, Switzerland
Five-ton truck

Sayers & Scoville, Cincinnati, O.
One-and-a-half-ton truck

Studebaker Automobile Co., South Bend, Ind.—Studebaker
Five trucks, one delivery wagon, one chassis

Weeks Commercial Vehicle Co., Chicago
One delivery wagon

Worth Motor Car Co., Kankakee, Ill.
Sixteen-passenger sightseeing car, one 3-ton truck, one chassis for sightseeing car, one motor

Directory of the Accessory Exhibitors

Ajax-Grieb Rubber Co., New York
Tires

American Electrical Novelty and Mfg. Co., New York
Ever-ready motor accessories

Appliance Mfg. Co., Chicago
Motor bumpers, tire brackets, foot rails and robe rails

Arnstein, Eugene, Chicago
Accessories, lamps, wind shields, etc.

Atlas Mfg. Co., Lansing, Mich.
Crankshafts

Atwater-Kent Mfg. Works, Philadelphia
Spark generators and meters

Aurora Automatic Machinery Co., Aurora, Ill.
Motors

Auto Accessories Mfg. Co., Detroit, Mich.
Tops, wind shields, tire covers

Auto Goods Co., Boston, Mass.
Cinch tire repair kit

Auto Improvement Co., New York
Speedometers, Ever-ready tire tools, vulcanizing outfits

Auto Parts Co., Chicago, Ill.
Motors, transmissions and parts

Auto Pump Co., Springville, N. Y.
Tire pumps and tank gauges

Avery Portable Lighting Co., Milwaukee, Wis.
Auto-gas tanks

Badger Brass Mfg. Co., Kenosha, Wis.
Lamps and generators

Baldwin Chain and Mfg. Co., Worcester, Mass.
Chains and sprockets

Bemus, T. Alton, Boston, Mass.
Timers and distributors

Bosch, Robt., New York, N. Y.
Magnetos, spark plugs and cables

Bowser & Co., Ft. Wayne, Ind.
Self-measuring gasoline and oil tanks

Breeze Carbureter Co., Newark, N. J.
Carbureters and fuel strainers

Briscoe Mfg. Co., Detroit, Mich.
Radiators, hoods and fenders

Brown-Lipe Gear Co., Syracuse, N. Y.
Transmissions, equalizing and steering gears

Brownell Motor Co., F. A., Rochester, N. Y.
Motors and transmissions

Byrne-Kingston & Co., Kokomo, Ind.
Carbureters, mufflers and pumps

Callahan & Co., John, Seattle, Wash.
Radiator compound

Cartier-Chapman & Co., Ludington, Mich.
Wind shields

Central Rubber Co., Chicago, Ill.
Rubber clothing, tires, rubber goods

Chicago Battery Co., Chicago, Ill.
Batteries and lamps

Chicago School of Motoring, Chicago, Ill.
Motor school

Connecticut Telephone and Electric Co., Meriden, Conn.
Coils, timers, switches, volt meters, exploring lamps

Continental Caoutchouc Co., New York, N. Y.
Tires

Continental Motor Mfg. Co., Muskegon, Mich.
Motors

Cook's Sons, Adam, New York, N. Y.
Albany grease

Cook's Standard Tool Co., Kalamazoo, Mich.
Motor jacks

Cotta, Chas., Rockford, Ill.
Vise and transmission gears

Cowles & Co., C., New Haven, Conn.
Motor sundries

Cramp & Sons, Wm., Ship and Engine Bldg. Co., Philadelphia, Pa.
Motor and motor boat castings

Daniels, W. Smalley, Boston, Mass.
Timers, jacks, tire tank, foot and robe rails, metal tool boxes

Davis Robe Co., Chicago, Ill.
Motor robes

Diamond Chain and Mfg. Co., Indianapolis, Ind.
Chains and axles

Diamond Rubber Co., Akron, O.
Tires

Dietz Co., R. E., New York, N. Y.
Lamps and generators

Dixon Crucible Co., Joseph, Jersey City, N. J.
Graphite and graphite greases

Duff Mfg. Co., Pittsburg, Pa.
Motor jacks

Edmunds & Jones Mfg. Co., Detroit, Mich.
Lamps and generators

Electric Storage Battery Co., Philadelphia, Pa.
Batteries

Electrical and Mechanical Development Co., Asbury Park, N. J.
Hickley rectifiers

Elite Mfg. Co., Ashland, O.
Motor jacks and pumps

Empire Auto Tire Co., Trenton, N. J.
Tires and tire sundries

Excelsior Supply Co., Chicago, Ill.
Accessories, motors and motor cycles

Firestone Tire and Rubber Co., Akron, O.
Tires

Fisk Rubber Tire Co., Chicopee Falls, Mass.
Tires and detachable rims

Franco-American Auto and Supply Co., Chicago, Ill.
Accessories, lamps, wind shields, batteries, etc.

Fry, T. C. & W. L., New York, N. Y.
Spark plugs and terminals

G & J Tire Co., Indianapolis, Ind.
Tires

Gabriel Horn Mfg. Co., Cleveland, O.
Horns, shock absorbers and cut-out valves

Gemmer Mfg. Co., Detroit, Mich.
Steering geers

Goodrich Co., B. F., Akron, O.
Tires and tire sundries

Goodyear Tire and Rubber Co., Akron, O.
Tires, universal rims

Gray & Davis, Amesbury, Mass.
Lamps and generators

Gray-Hawley Mfg. Co., Detroit, Mich.
Chimes, mufflers, cut-out valves and engines

Ham Mfg. Co., C. T., Rochester, N. Y.
Lamps

Hancock Mfg. Co., Charlotte, Mich.
Gasoline gauge, mechanical oiler, robe and foot rails

Hans Co., E. E., Minneapolis, Minn.
Gasoline gauge

Hardy Co., R. E., New York, N. Y.
Spark plugs

Harris Oil Co., A. W., Providence, R. I.
Oil, greases, polish, transmission compound

Hartford Rubber Works Co., Hartford, Conn.
Tires

Hartford Suspension Co., Hartford, Conn.
Shock absorbers

Healy Leather Tire Co., New York, N. Y.
Leather tire shoes

Heinze Electric Co., Lowell, Mass.
Spark coils

Heitger Carbureter Co., Indianapolis, Ind.
Carbureters

Hotchkin Mfg. Co., Chicago, Ill.
Anti-jolt device

Imperial Brass Mfg. Co., Chicago, Ill.
Pumps, name plates, robe rails, etc.

Indestructible Steel Wheel Co., Chicago, Ill.
Indestructible steel wheels

Index Speed Indicator Co., Minneapolis, Minn.
Speed indicators

Jones Speedometer Co., New York, N. Y.
Speedometers

Kimball Co., C. P., Chicago, Ill.
Bodies, wind shields and extra tonneau seats

Kinsey Mfg. Co., Dayton, O.
Radiators, mechanical oilers, pressed steel frames, fenders, mufflers, etc.

Kokomo Electric Co., Kokomo, Ind.
Coils, timers, plugs and switches

Lang-Smith Motor Co., Chicago, Ill.
Motors

Leather Tire Goods Co., Newton Upper Falls, Mass.
Anti-skids

Limousine Carriage Mfg. Co., Chicago, Ill.
Wind shields

Lipman Mfg. Co., Beloit, Wis.
Speed indicators, pumps, timers, tank gauges, odometers

Long Mfg. Co., Chicago, Ill.
Radiators, hoods and fenders

Directory of the Accessory Exhibitors

McCanna Mfg. Co., Chicago, Ill.
Mechanical oilers

McCord & Co., Chicago, Ill.
Mechanical oilers, radiators, magnetos, carbureters, copper, asbestos gaskets

McMullen, Roger B., Chicago, Ill.
Representing Hydraulic Pressed Steel Co., of Cleveland, O. Pressed steel motor parts

Manhattan Screw and Stamping Works, New York
Lamps, tire brackets, tire pumps, etc.

Michelin Tire Co., Milltown, N. Y.
Tires

Midgley Mfg. Co., Columbus, O.
Pressed steel wheels and detachable rims

Millwood Mfg. Co., Chicago, Ill.
Wind shields

Morgan & Wright, Detroit, Mich.
Tires

Morris Auto Co., Saginaw, Mich.
Tire protector

Morrison-McIntosh & Co., Grinnell, Iowa
Gloves

Mosler & Co., A. R., New York, N. Y.
Ignition devices

Motsinger Device Mfg. Co., Pendleton, Ind.
Mufflers, dynamos and timers

Motz Clincher Tire and Rubber Co., Akron, O.
Tires

Muncie Auto Parts Co., Muncie, Ind.
Parts

Murray, W. B., Chicago, Ill.
Transmission gears, clutches, differentials

N. Y. and N. J. Lubricant Co., New York, N. Y.
Non-fluid oils

National Battery Co., Buffalo, N. Y.
Batteries

National Carbon Co., Cleveland, O.
Dry cells

Neely & Co., Edward, Chicago, Ill.
Mechanical oiler

Nelson Wheel Co., Chicago, Ill.
Spring wheel

Never-Miss Spark Plug Co., Lansing, Mich.
Spark plugs, battery connections, chain tools, etc.

Newmastic Tire Co., Chicago, Ill.
Newmastic tire filling

Norton Co., Worcester, Mass.
Grinding machinery, grinding wheels, crankshafts

Norwall Mfg. Co., Chicago, Ill.
Motor chimes

Oliver Mfg. Co., Chicago, Ill.
Motor jacks

Pantasote Co., New York, N. Y.
Tops and upholstering

Pennsylvania Rubber Co., Jeannette, Pa.
Tires

Peterson Mfg. Co., O. W., Chicago, Ill.
Generators

Pittsfield Spark Coil Co., Dalton, Mass.
Coils, timers, magnetos, spark plugs

Precision Appliance Co., Chicago, Ill.
Mechanical oilers

Prest-O-Lite Co., Indianapolis, Ind.
Gas tanks for lighting, tire tanks, pneumatic jacks

Prosser & Son, Thos., New York, N. Y.
Steel for motor parts

Randall-Faichney Co., Boston, Mass.
Oil and grease guns, gasoline gauges

Rands Mfg. Co., Detroit, Mich.
Tops, wind shields and lamp brackets

Remy Electric Co., Anderson, Ind.
Magnetos and coils

Republic Rubber Co., Youngstown, O.
Tires

Robinson & Son Co., C. W., Baltimore, Md.
Oils and greases

Rose Mfg. Co., Philadelphia, Pa.
Lamps, generators and producers

Ross Gear and Tool Co., Lafayette, Ind.
Steering gears, bevel gears, universal joints

Rudd Mfg. Co., Pittsburg, Pa.
Automatic water heaters

Sager & Co., J. H., Rochester, N. Y.
Springs

Shaler & Co., C. A., Waupun, Wis.
Electric vulcanizers

Spicer Universal Joint Mfg. Co., Plainfield, N. J.
Universal joints

Spiltdorf, C. F., New York, N. Y.
Ignition apparatus

Sprague Umbrella Co., Norwalk, O.
Tops and folding wind shields

Stackpole Battery Co., St. Marys, Pa.
Batteries

Standard Lamp and Mfg. Co., Chicago, Ill.
Lamps and generators

Standard Roller Bearing Co., Philadelphia, Pa.
Axles, castings and forgings, ball bearings

Standard Varnish Works, Chicago, Ill.
Varnish

Stewart & Clark Mfg. Co., Chicago, Ill.
Speedometers

Stratton Carriage Co., C. H., Muncie, Ind.
Folding bodies and tops

Studebaker Bros., Chicago, Ill.
Wind shields

Swineheart Clincher Tire and Rubber Co., Akron, O.
Clincher tires

Timken Roller Bearing Axle Co., Canton, O.
Roller bearings and axles

Troy Carriage Sun Shade Co., Troy, O.
Wind shields

Turner Brass Works, Sycamore, Ill.
Motor bumpers, name plates, etc.

Valentine & Co., New York, N. Y.
Varnishes and colors

Veeder Mfg. Co., Hartford, Conn.
Tachodometers, odometers, counters, cyclometers

Ventilated Cushion and Spring Co., Jackson, Mich.
Cushions

Vesta Accumulator Co., Chicago, Ill.
Batteries, lamps, horns, annunciators

Visor Knitting Co., Niagara Falls, N. Y.
Visor hoods and mufflers

Warner Gear Co., Muncie, Ind.
Transmissions, differentials and steering gears

Warner Instrument Co., Beloit, Wis.
Auto meters, anemometers, cut meters, tachodometers

Webster Muffler Co., Galesburg, Ill.
Mufflers

Weed Chain tire Grip Co., New York, N. Y.
Chain tire grips

Western Malleable Steel Co., Detroit, Mich.
Drop forgings, malleable steel castings and gray iron castings

Wheeler & Schebler, Indianapolis, Ind.
Carbureters

Whiteley Steel Co., Muncie, Ind.
Steel castings

Whiteside Mfg. Co., Indianapolis, Ind.
Flexible wire wheels

Whitney Mfg. Co., Hartford, Conn.
Chains

Witherbee Igniter Co., New York, N. Y.
Batteries, timers, coils, switches, plugs, inspection lamps and cable wire

Zeglen Auto Tire Co., Chicago, Ill.
Puncture-proof tires

Zoar Storage Battery Co., Zoar, O.
Storage batteries

MOTOR CYCLES

American Motor Co., Brockton, Mass.
M.-M. motor cycles

Armac Motor Co., Chicago, Ill.
Armac motor cycle

Auto-Bi Co., Buffalo, N. Y.
Auto-Bi motor cycles

Consolidated Mfg. Co., Toledo, O.
Yale-California motor cycles

Curtiss Mfg. Co., Hammondsport, N. Y.
Curtiss motor cycles

Excelsior Motor and Mfg. Co., Chicago, Ill.
Triumph and Excelsior motor cycles

Fowler-Manson-Sherman Cycle Mfg. Co., Chicago, Ill.
Manson motor cycles

Harley Davidson Motor Co., Milwaukee, Wis.
Harley Davidson motor cycles

Hendee Mfg. Co., Springfield, Mass.
Indian motor cycles

Hornecker Motor Mfg. Co., Whiting, Ind.
Torpedo motor cycles

Light Mfg. and Foundry Co., Pottstown, Pa.
Light motor cycles

Reading-Standard Co., Reading, Pa.
Reading-Standard motor cycles

TIMKEN BOOTH IN THE FOREGROUND

PRESIDING OFFICER A. G. BATCHELDER, Vice-President Haradon and other officials of the Pioneers intend to work hard to bring about a real gathering of the old-timers next year. Mr. Batchelder believes the Pioneers should in a year be an organization even larger than the League of American Wheelmen. He believes veterans have been overlooked in the past and have not been posted on the annual meetings. At the annual gathering held last Sunday evening at the New Southern it was the consensus of opinion among the Pioneers that cycling was coming back to favor and many promised to again enter the field should the wheel return to favor.

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When W. J. Morgan reached the show on Sunday inquiries were at once hurled at the veteran race promoter in regard to the Ormond meet. "We shall have a meet," said Mr. Morgan, "and it will be over the beach course with loops at both ends. Secretary Butler has assumed the active management and is remaining in Florida to construct the loops and also to rewire the entire route. The races at this meet will include the 150-mile contest for stripped stock cars, the 200-mile Corinthian race for amateurs, in which we have every hope of having William K. Vanderbilt, Jr., Harry Payne Whitney and others as competitors and the race of 300 miles for cars constructed for the Vanderbilt race. The opening event in March will be the race from Jacksonville to Miami and the second week will see the boat race from St. Augustine to Lake Worth. The third week will be the week of the regular Lake Worth motor boat tournament."

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Frank Nutt, winner of the trophy offered by Samuel A. Miles for the reliability contest, rather objected to the duplicates of his trophy around the building. These are used as decorations and no sooner had Nutt won the trophy than he made an offer to Mr. Miles for every one of the replicas shown in the buildings in which the motor shows were held. Mr. Miles accepted and within a few minutes was besieged with more offers for the trophies.

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George Wilcox, who drove a car through the country back of Pedestrian Weston, tells of many an amusing incident along the route. Mr. Wilcox exhibits the car at the show. "One day," said he, "we were tooling along at about 4 miles an hour following the game old codger when a farmer came along in a buggy and stopped. 'Have a lift, friend?' said he to Weston. The old man kept right on plodding and finally said, 'No, I'll keep along. It's too expensive to ride.' The farmer looked him over and inquired regarding his destination. 'Chicago,' said Weston. 'Where from?' asked the farmer. 'Portland, Me.,' replied Weston. Then the farmer glared. 'Go along you fools,' said he to the horses, 'that man's crazier than a bedbug; get up,' and he drove away."

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Barney Oldfield was a daily visitor at the show. The champion of the track, now retired, is talking of going to Pittsburg to join the colony of ex-champions now located there. In Pittsburg are Earl Kiser, E. C. Bald, once a popular champion, and Johnnie Johnson, the greatest cycling record-breaker of history. All are in the motor car business and Oldfield has an offer from Pittsburg which he may accept. At any rate, Oldfield, who has tired of the track and taking fences, will enter the game somewhere and is deluged with offers, any one of which he may accept at any time.

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Prominent out of doors is the monster electric sign advertising Stewart speedometers just placed on the roof of the Excelsior Automobile Supply Co. in Michigan avenue, between Fourteenth and Sixteenth streets. It is 60 feet high, and 28 feet in diameter, the moving hand being 18 feet in length. The sign is almost an exact reproduction of the Stewart speedometer, and it is said it is the largest electrical sign in the country.

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"Beyond any doubt this is the greatest motor car show that was ever held in this country. This applies not only to the completeness of detail but to the elegance of the decorations and appointments of the buildings and booths," said Barney F. Everitt, general manager of the Wayne company and a director of the Automobile Club of America. Continuing, Mr. Everitt

IN THE GALLERY OF THE COLISEUM

said: "Not only is the show a fine one on the surface but it is surprising most everybody because of the results. Most of the exhibitors expected to do little or no business, but a large number have informed me that to their great surprise a good many sales have been made. I don't suppose the Wayne company is any different from its brother concerns, and speaking for it I can truthfully say that we made more sales than we had expected to make. Financial conditions are unquestionably much improved in this section of the country."

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"Regardless of what the demand may be, we are going to turn out about 175 to 200 cars this season," said General Manager James Joyce, of the American Locomotive Automoblie Co. "We could exceed that output and still not exceed the number of cars we could sell, but by so doing we could not maintain the exclusive excellence which has always been the proud and truthful boast of this company."

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Several entries for the New York-to-Paris race are expected, for the press agents to a man are anxious to make that trip and each is quite anxious to convince his maker that he should get into the game. To enter is good policy, to go quite another, but it seems almost probable that America will be largely represented in the list. The European field is very attractive to many of the American makers. Frank Nutt, the successful driver of the victorious Haynes, already has applied to the Haynes Automobile Co. for permission to enter the contest and Sales Manager C. B. Warren is anxious to see Nutt in the lists.

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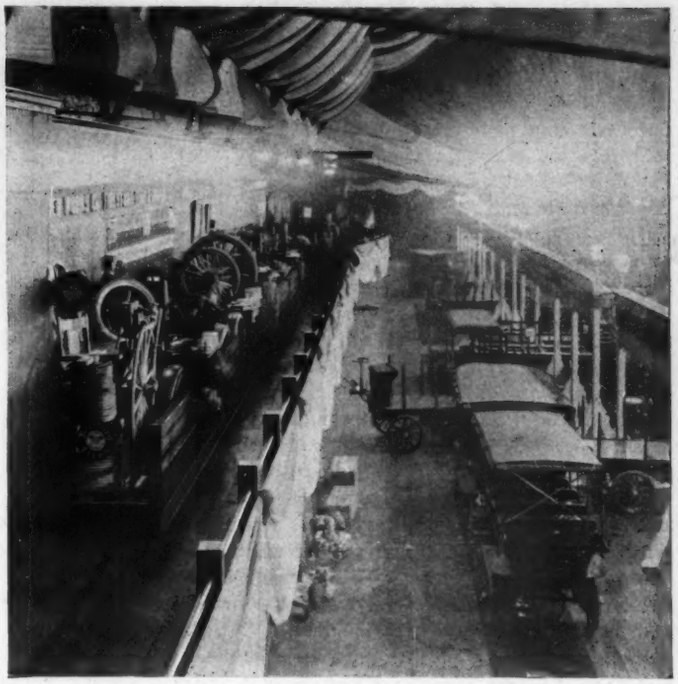
"Such is fame," said Barney Oldfield when he was introduced to a prominent newspaper advertising man at the show. This man, in the search for copy, ran across Oldfield and a friend and was introduced. "In the business, are you?" said the man, and Barney bought drinks for the crowd. The incident was a reminder of the New York show when Oldfield wandered into the Winton exhibit and spent half an hour with a salesman who tried his best to dispose of a car. The salesman finally said, "Is there anything else I can tell you?" and Barney replied, "You might tell me how many cylinders the car has." He ultimately informed the salesman that he might be in the field for an eight-cylinder Winton, as that was what he had been accustomed to driving. Finally he offered to split the difference and take a seven-cylinder car if it could be obtained. The salesman found that things were wrong somewhere and from that time on Barney was unable to catch the eye of that salesman at the Winton booth.



Looking Down at the Commercial Exhibit

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The Mount Washington 6-day endurance run for next summer, the last week in June probably, is almost settled upon. Morgan is making all the necessary arrangements and went to Chicago to talk over the late reliability run of the Chicago Motor Club and the rules of the contest. The plan is to copy the Scottish reliability run rules, 200 miles daily for 5 days, and a climb of Mount Washington the final day. The nightly rendezvous will be at the Mount Washington and Mount Pleasant hotels, if the plans did not miscarry, and it is thought a large entry list will be secured.

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"Two-cycle enthusiasts are being made more rapidly this year than ever before," said J. H. Becker, of the Elmore valveless two-cycle car. "I quite agree with most of the other exhibitors in saying that this is the most beautiful and one of the most satisfactory shows that was ever held. It is really remarkable, however, how the two-cycle proposition is growing. The only trouble we are experiencing at the Elmore booth is in demonstrating the principle of our cars to the crowds that come to learn. It strikes me the next show we attend will see us on hand with two sectional demonstration cars instead of one, for if the number of people interested in two-cycle facts increases in the next year as it has in the past one machine will not accomplish much."

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Prominently displayed in the White exhibit is the Hower trophy, which was won by the White roadster on the A. A. A. tour. This was the only individual prize offered on the tour, and the award of the trophy was made after a long run-off between the White and the Stoddard-Dayton.

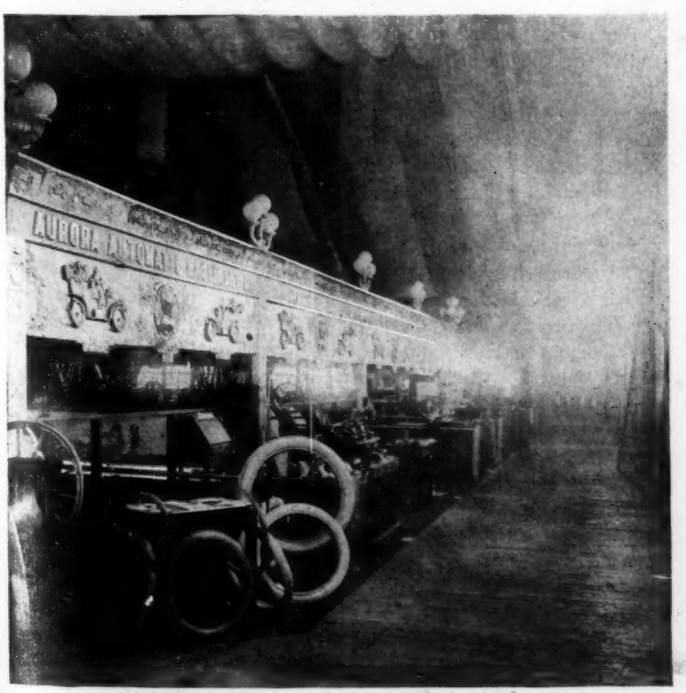


Exhibit of the Aurora Automatic Machinery Co.

AMERICAN DESIGNERS SHOW PROGRESS

Berne Nadall Makes Interesting Comparisons of Motors Made in This Country and Abroad

IT IS said that between extremes will be found the acme of perfection. A well-balanced man is not considered a crank, therefore the well-balanced car—from the engineer's point of view—is not a freak. Some 3 years ago while abroad I had occasion to condemn American cars and construction generally, and as I viewed the American proposition through English and continental glasses, I was at a loss to protect myself. It must be admitted that between the period from 1903 to 1906 we were certainly in a state of uncertainty and of constant evolution, and considerably behind our foreign confreres, especially with regard to four and six-cylinder vertical engine cars. If one reflects for a moment he will exclaim at the wonderful change which has taken place. One cannot help but think of the halcyon days of the one-lunger and the double-opposed which have passed away, and with a feeling that the orthodox car is the European conception as we find it today. I do not want to be misunderstood with regard to my opinion of the satisfactory results obtained by the horizontal engine, as it is still made in a few cases. However, I am dealing principally with the orthodox car, and from that standpoint my remarks must be reviewed.

Today, with few exceptions, all the makers are exponents of the four and six-cylinder upright engines under a bonnet in the front of the car, and while most of them have previously made the horizontal proposition I do not believe that any of them would revert to the horizontal again. I judge it has been a case of art predominating over science as much as anything else that we are today in unity in the belief that we are now fast approaching the zenith of perfection of the continental idea—with sliding gear and propeller shaft transmission—or, with a few exceptions, double-chain drive; the latter gradually succumbing to the inevitable direct drive with supported rear axles. Before proceeding with my remarks, I had intended to make minute comparisons with the European product, but after a close scrutiny of the cars on exhibition at the Chicago show I am compelled to remark that the closer the examination I made the less room I found for making comparisons. It is certainly gratifying to our American spirit to realize that we are today making a car that is not second to anything produced on the other side of the herring pond. It certainly is a token of merit to our American progressiveness. Not only are we producing a high-class American car of European design, but we are in many ways excelling in the general makeup of the whole construction. In the case of body suspension we certainly are in advance of our European friends. I particularly refer to the spring suspension of such cars as the Kisselkar, Rainier, Pierce-Arrow, Packard, Rambler and Columbia, which certainly have excellent principles. The long spring of good width and beautifully supported which we see on the above cars are certainly worthy of much commendation. The French product of 1907 or 1908 may equal but certainly will not surpass those productions. While we have on many cars the platform type, which has five points of contact, the springs are much better in size and the leaves greater in number, which not only means a slower and more even action in depression, but a very mild return, which has heretofore necessitated shock absorbers to a very great extent. In some cases, on such cars as the Welch, Thomas Cab, Moon, etc., I even find full elliptics, which are used mostly without shock absorbers.

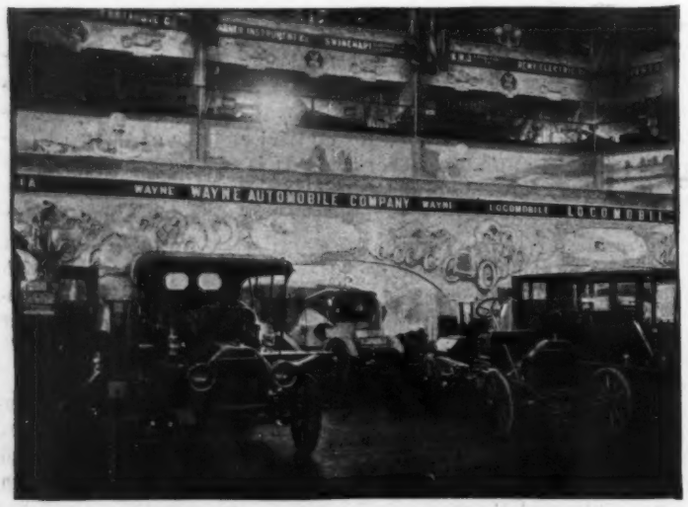


EXHIBIT OF THE WAYNE AUTOMOBILE CO.

In comparing the engines, I find them not the rough, badly proportioned motors of only a few years ago, but really works of art—with neatly balanced waterjackets and crankcases, which give a feeling of great power with light weight and accessibility. In the case of the Winton, I must remark on the accessibility of the crank box. While one will remark that such convenience is unnecessary, I am inclined to believe other makers are leaning in the same direction. Several of the best French designers are paying attention to this detail, however mostly with regard to a quick release of the under half of the crankcase—that is, by a quick separation from the upper half without disturbing anything else, even the under pan which it will form. While this is a very neat way of securing access to the crankshaft and bearings, I think a combination with view holes at the sides would still be better. Another point I note with pleasure is the tendency of the modern American maker to set his engine back of the front axle and the shaft, on a line with the center of the axle. While it is impossible to get a lower gravity point than the center of the axle or slightly above it, it must be conceded that the lower the point of gravitation the much better will be the running of the car. We are quite aware that a clearance between the car and the ground must be taken into consideration; however, that clearance has a limit of about 12 inches, and it has been only lately that the makers have studied the lowering of the engine, at the same time considering the maximum clearance. Of course, the continental or English engines are made with less clearance, and we are not expected to secure as low a point for our weight to hang as they are able to secure. On the other hand, our wheel construction is admittedly stronger, and we use larger wheels and tires to compensate for any differences there.

I am also pleased to note the great improvement made in the brakes of the American cars. The 1908 models, generally speaking, are par excellence. I am of the opinion that reliability contests and Glidden tours have been responsible for this much-needed improvement. In some cases I find no shaft brakes at all, and both brakes are on the road wheels. I doubt if this is a great improvement over the gearshaft pedal brake, and the internal expanding wheel brake by side lever. It strikes me that the latter cannot be improved upon. However, the point I desire to make more particularly is the difference in the circumference and width of the brake drums and bands. It is certainly obvious to anyone that a small diameter of a narrow width in a break drum, such as I saw on one car some months back, which was about 8 by 1½ inches, is certainly not strong enough for the rough roads and hills with which we must contend in this country. Not only are such brakes lamentably weak, but a quick action of the lever on such a break is sudden and jarring, which necessarily means severe jolting on tires and all suspended parts. The larger circumference and great width give a gentle pull up of great force. I must highly recommend the design of the brakes on the cars.

Another point of great interest is the vastly improved differential construction of the larger cars. In my mind at this point we have exceeded the European engineer. On every car I found that great attention had been paid to all parts behind the gear box. On the Oldsmobile the sides have the stay rods, from the frame to the differential housing. The designer has taken further

precautions by affixing a strong stay at two points above and below the crown wheel in the differential, leading to a forward point behind the gear box, at which point he has left a vertical spiral spring action in accord with the action of the rear springs only. While a good many other makers, such as Stevens-Duryea, Glide, Premier, Haynes and the Reo four-cylinder do practically the same thing. This particularly drew my admiration.

With regard to gear boxes, I see an inclination towards vertical gearsets. This is hardly in keeping with general European design. However, there are cases on the other side where this is done. I cannot agree to accept this as an improvement over the horizontal pattern solely on account of the fact that the lower set of gears are drowned in oil and grease. The upper set, by carelessness, might often be without any. Furthermore, our lubricants vary in density and purity to such an extent that I am sure there will be a caking up and solidifying of the debris or churned ingredients. I have seen more than one case of gearbox trouble due to such a design. On the whole the gearsets are very neat, indeed, and are a credit to the makers.

One improvement that deserves mention is the studied construction of the exhaust. On the Pierce-Arrow little six I find an exhaust pipe which allows a freedom of passage that can hardly be improved upon. At each cylinder the cubical increase of the interior is equal to the increase of the entering charges, after which they are carried through the long exhaust pipe of variable proportions to the rear of the car, where they are undoubtedly two-thirds spent before entering the exhaust box at all. I find this condition or practically the same condition, but done in slightly different ways, on the Oldsmobile, Thomas, Lozier, Matheson and other cars.

A pleasing tendency which is found in some of the cars is that of the rocker valve tappets at the top of the cylinders. This sort of valve construction appeals to me very much. It is certainly simpler and at a point at the top of the cylinder which should show greater power. I believe the continental maker has admitted an increase in power through this means of opening and closing the valve above the ordinary pattern. I am inclined to believe an exhaust valve should open at a point farthest away from the top of the piston, and as far away from the inlet as it can be made, and while the rocker valve system has numerous other reasons for its existence, it certainly is preferable to the old system in this respect. Such examples of this class of construction are found in the Stoddard-Dayton, Knox, Mitchell, Pope-Hartford, Pope-Toledo, Welch, Autocar and others.

In the case of the Knox water cooler, the upper half of the cylinder is made separable with pocketed waterjackets, which appear to me to be an improvement. I judge that a great deal more can be done by way of improving water circulation around the valves by this separable top and pocket than by any other means. However, we must await results on this innovation. I have never seen such a thing done before on the other side of the water.

There are numerous other points which I would like to take up and compare with the continental designs, but space does not permit of it. Perhaps at a later date I may conclude this article, but for the present I will close with a few remarks on minor points. The De Luxe car shows a very strong rear axle construction of the English Speedwell type, the latter having used this solid under support for a number of years. Most of the cars have well-designed rubber bumpers, well set in the center of the long ample springs.

NATIONAL LOCATED UNDER AN ARCH

The compensating principles used on rear brakes are worthy of mention in the smaller four-cylinder Maxwell, the Pierce-Arrow, Thomas cab, Kisselkar and others. A point worthy of notice in the Berliet is a foot-pedal speed change. This operates between the third and fourth speed, and is of a dog-and-socket pattern, which engages in either direction without notice. It is commendable improvement for high power cars, with ratios of gearing high, making it very suitable for town work.

Separate cylinders and cylinders cast in pairs still hold the fort, as abroad. In the small cars of foreign make we may expect to see cylinders in many instances cast en bloc. I notice that one car has done this, which I cannot commend for this side of the water, where we have much more severe weather than abroad, and a crack in the waterjacket of such a design would be anything but pleasant.

Most all cars are fitted with magnetos, or have left room for them, and in many cases two systems are fitted, the Peerless being particularly good.

The Rambler has a particularly pleasing design this year—the shaftdrive cover and stay rods being quite Frenchy and their gearbox slightly inclined. It also has a splendid exhaust arrangement. The oiling systems are alike in many cases, the McCord, Lavigne, Hill Precision and other well-known systems being mostly employed. However, I prefer the pump integral, with the engine in the crankcase. I will deal with the benefit of such a system at a future date. The selective type of gear levers predominates in four-cylinder cars.

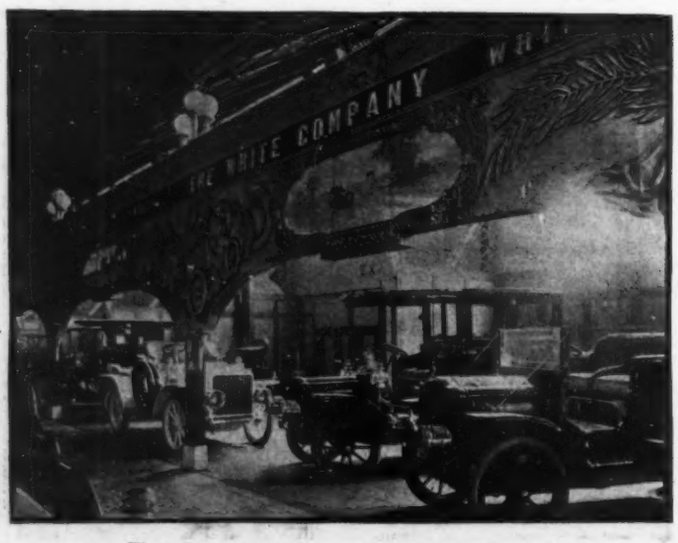
STANDS OF THE ELMORE AND FRANKLIN COMPANIES IN THE COLISEUM

Chassis of the Two Pierce-Racines Somewhat Similar

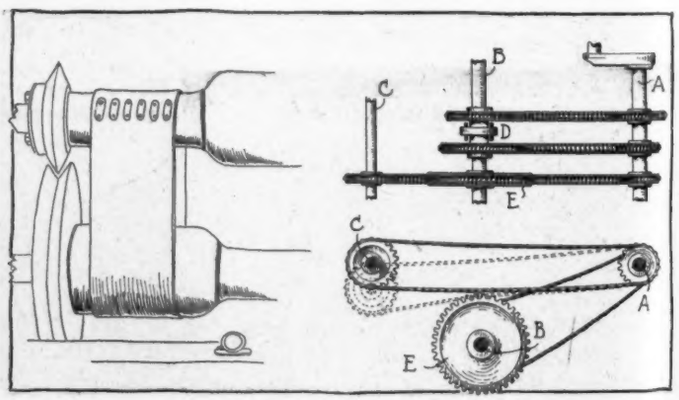
Pierce-Racine cars are on exhibition in two models, both of the four-cylinder type with cylinders in pairs and valves opposite, differing only in size and a few other details. Back from the motor the two chassis are very much alike. The big car, with a 40-45-horsepower rating, can be taken as an embodiment of the principle employed in the smaller machine and its power plant and transmitting system is as well shown in a motor and gearset mounted in a corner of the exhibit space, the motor tilted on its side with the lower half of the crankcase removed, exposing the crankshaft, its three bearings and the camshaft and connecting rod construction. On this motor the timer is carried on a vertical shaft between the cylinder castings at the right and above the cylinder heads. The motor has ignition by jump spark system with storage cells as the current source and lubrication reposes in Lavigne oiler with four leads passing to the end bearings of the crankshaft and the two compartments of the crankcase. In one model the oiler is driven by belt from a pulley on the commutator shaft, whereas in the other it is driven through a pulley at the forward end of the engine. The crankcase in both has a reduced appearance, due to carrying the half-time gears entirely within its forward end. In tracing the power transmission from the motor to the rear axle attention first centers on the cone clutch of the standard leather-faced style, which, however, in the small car is of the reversed type, engaging by a backward motion. Next comes the three-speed transmission, operating on the progressive principle and in which the shafts are in the same vertical plane, with the squared mainshaft on top. The sliding mechanisms for operating are enclosed and on direct speed the countershaft gear is thrown out of mesh, leaving the shaft idle. In the large car the rear axle is of the ball-bearing floating type and four brakes are furnished, internals and externals, all of the metal-to-metal variety. The small car, rated at 35 horsepower, has the same transmission as in its bigger brother and a lighter rear axle of the non-floating style. Its brakes are lined with camel's hair, the timer is on a shorter shaft and the oiler is driven by belt off the front end of the camshaft. Both cars have 106-inch wheelbase, semi-elliptics in front and rear, but differ in that the little car has a Barnes steering gear, the big car a Smith steering gear and although the small car has a straight wood dash a pressed steel one of the concave variety is in use on the big machine. Both vehicles have tubular front axles with Lemoine type steering knuckles. For the first time the company shows a limousine car and conspicuous in it is the use of a pair of folding seats which back the driver's seat. The front part of the enclosed compartment is upholstered and at first glance the observer would fail to note that the lower half is divided and that by simply seizing it at the bottom and raising it on a horizontal he has a pair of very substantial seats, either of which can be used as desired or both used at the same time.

Transmission Is the Bugmobile Peculiarity

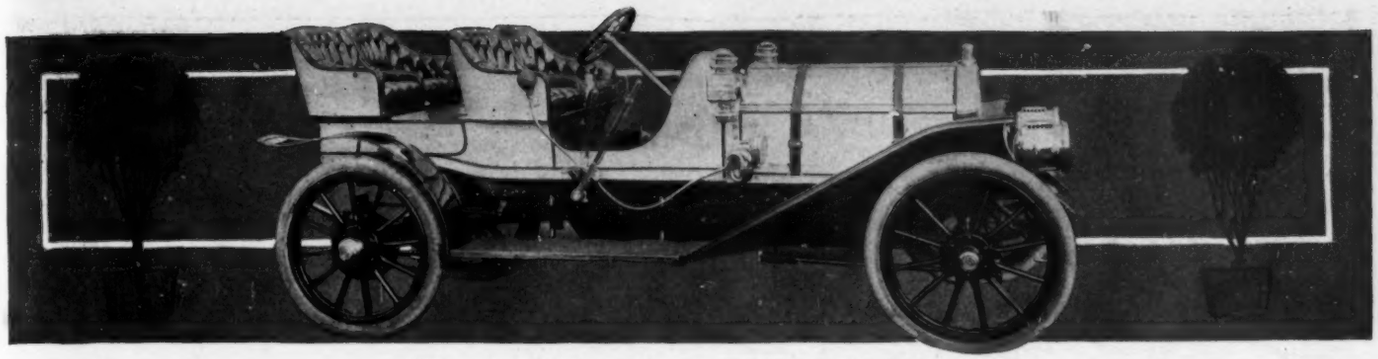
Every motor buggy has its peculiarity and that of the Bugmobile, manufactured in Chicago, consists in its two-speed and reverse transmission, which is not of the planetary or friction type so common on motor buggies. The power plant in the Bugmobile, by way of introduction, consists of a two-cylinder opposed air-cooled engine located amidship, with the cylinders placed longitudinally and the flywheel at one side. The crankshaft is continued to one side and carries three sprockets, secured to the shaft. Almost directly beneath this shaft is a countershaft, extending crosswise of the car and having pulleys on its end for cable drive to the rear wheels. On this shaft are three sprockets, two loose on the shaft and secured thereto at the will of the driver by a clutch of the pin type. Chains pass over two of the gears on the motor shaft and two on the countershaft, and accordingly as the sprocket on the jackshaft is clutched to the shaft the driver gets first or second speed ahead. In reversing a third shaft is required, which is located on the same level and in front of the crankshaft. This shaft carries one sprocket, which has chain connection with the sprocket on the crankshaft. Directly beneath this chain is a sprocket on the countershaft, so that to drive in reverse the forward sprocket is lowered until the chain meshes with the sprocket on the countershaft, thereby giving a reverse movement to the countershaft. This is illustrated diagrammatically, in which A is the motor shaft sprocket, B the countershaft sprocket and C the swinging sprocket, which, when moved downwards, engages the chain



WELL-LIGHTED STAND OF THE WHITE STEAMER



SPEED BELT ON THE PRICE CAR AND CHAIN GEARSET OF BUGMOBILE

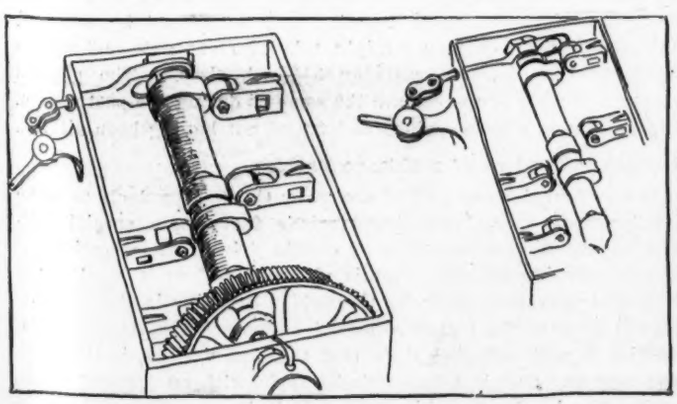


ONE OF THE NEW SIXES, THE C. V. I. IN ROADSTER FORM

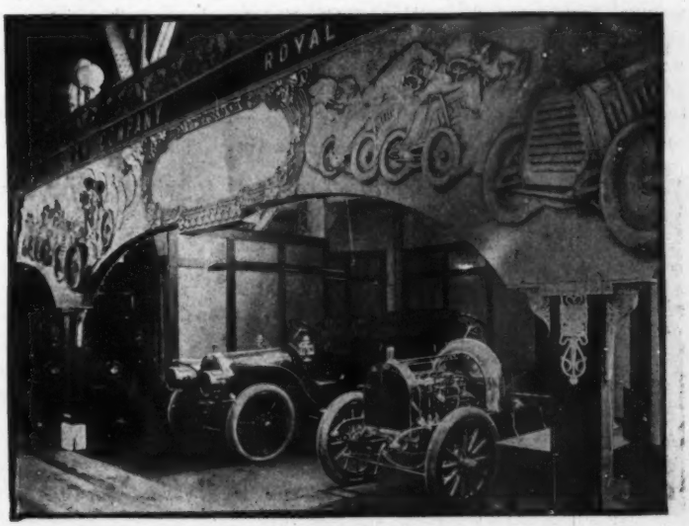
with the sprocket C, giving a reverse movement. When changing speeds the rear axle is rocked forward to give sufficient slack in the cables, so that the result is the same as when a clutch in a four-cylinder car is taken out. Apart from this transmission scheme the Bugmobile is conventional with its air-cooled cylinders, its mechanical force feed oiler with four sight feeds, its dry cell ignition with Splitdorf coil and its regular carburation plant. The car is without differential, but by a simple contrivance and without the use of gears the driver is enabled to tighten one cable and loosen the other each time the steering arm is moved in turning a corner. When this is done the cable on the outer wheel does the propelling, the other one remaining idle. The power plant is carried on an angle steel framework and front and rear axles are Timken constructions, fitted with roller bearings for the wheels. A set of four elliptic springs supports the body, and wheels are 40 and 44 inches front and rear. The wheelbase measures 74 inches. The motor is rated at 10 horsepower and has mechanical valves, with the cylinders and pistons ground to size. The crankshaft is a high carbon steel drop forging ground to a perfect bearing, connecting rods are drop forgings provided with oil grooves along the top sides and bearings are bushed with a high grade of anti-friction bearing metal.

Cutting Six Has Two Constructive Peculiarities

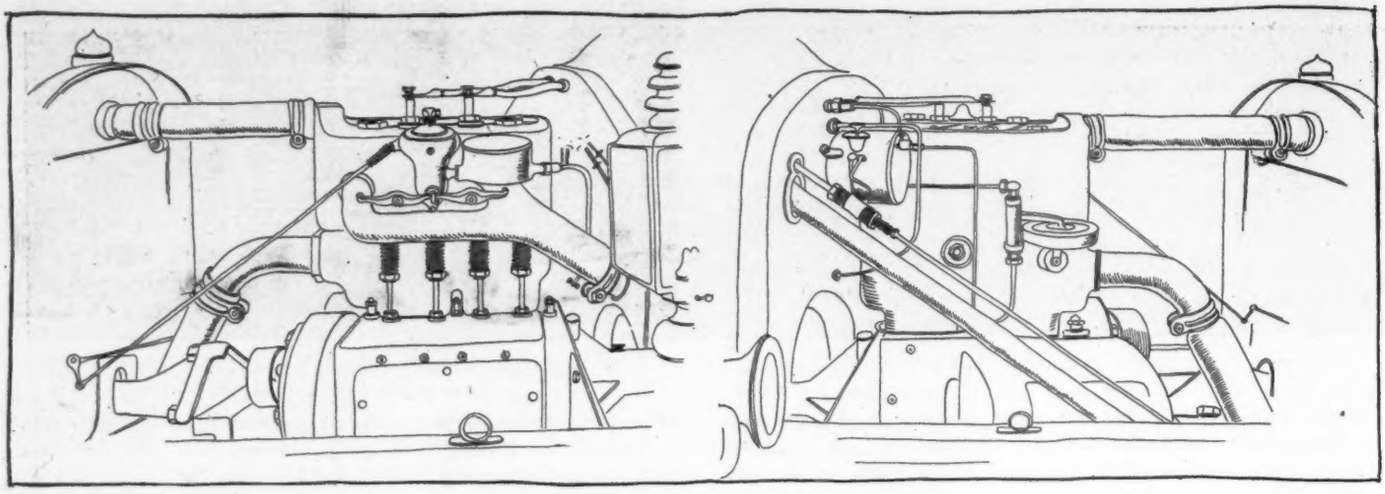
A car unknown to the motoring public previous to the opening of the present show, yet one which looks the part of a finished product of 3 or more years' standing, is the C. V. I., which translated becomes the Cutting Six, the V and I being the Roman notation for the word six. Although new to the public, the maker claims the motor and car have been under test for upward of 14 months and the company's intention is to manufacture from twenty-five to thirty during the coming season. The six-cylinder motor, rated at 40 horsepower and with cylinders having 4-inch bore and 5-inch stroke and the cylinders in pairs and valves opposite, has two constructive peculiarities, one of which is of commendable design and consists in using seven bearings to carry the crankshaft, notwithstanding the fact that the cylinders are cast in pairs, the car thus being one of the first of American make to have this construction. The majority of makers using twin cylinders are content to place a crankshaft bearing between the pairs of castings, but up to the present have not gone into the subject of placing a bearing between the two cylinders constituting one casting, the reason advanced being the lack of room. In the C. V. I. this has been overcome and in doing it the connecting rods have been but slightly offset. The crankshaft, formed along conventional six-cylinder lines, is carried on a double race of ball bearings at the rear, a single race of ball bearings being at the front and plain bearings being on adjacent cylinders, the bearings between the adjacent cylinders being supported in transverse bridges in the upper portion of the crankcase. The ostensible reason for using seven crankshaft bearings is the extra rigidity imparted to the crankshaft, which is a valuable feature where crankshafts are of such length as required in six-cylinder construction. The second novelty in connection with the motor is housing the camshafts in separate compartments outside of the crankcase, as well as the carrying of each shaft on three F and S ball bearings. But the feature of the shaft is that the half-time gear is mounted loosely on a round section of the shaft and is secured thereto by a disk fitted over a squared section, this disk having a series of pins for entering corresponding holes in the half-time gear. By this construction it is possible to change the timing of the shaft by turning the half-time gear so the relative pin and slot position is changed. A bit of accessibility appears in making the cover for each camshaft in one piece with the guides for the push rods for opening the valves, so that by loosening the camshaft compartment cover all of the push rods with their guides and other parts can be removed bodily. Lubrication is by a six-feed Hill oiler and to insure an oil level between each of the six cylinders there is an equalizing piping system beneath the crankcase in the form of a horizontal transfer pipe with a vertical branch to the bottom of the crankcase beneath each cylinder. To insure good splash lubrication as well as the proper oiling of the lower bearings of the connecting rods, oil scoops are affixed to the bottom ends of the connecting rods, these scoops dipping into the oil level and thereby forcing a portion of the



COMPRESSION RELIEF ON THE MASON



HANDSOME DISPLAY OF ROYALS

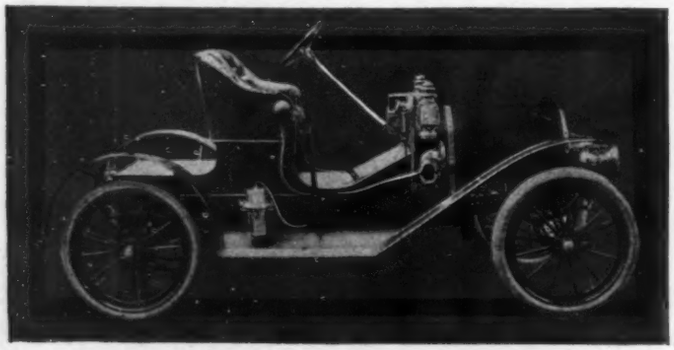


LEFT AND RIGHT SIDES OF THE OAKLAND MOTOR

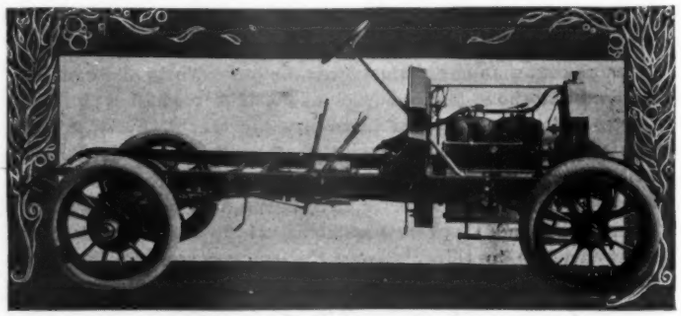
oil through them to the connecting rod bearings. Ignition is by a dual system, consisting of Bosch magneto and storage cells. A Schebler carbureter is fitted. Back from the motor the car is a conventional construction employing a cone clutch with cork inserts, a Warner three-speed selective gearset, shaft-drive and floating rear axle of the Garford type, with all parts carried on ball bearings. On the rear wheels are internal and external brakes, the internals metal shoes and the externals lined with camel's hair. The front axle is an I-beam construction and the steel framework has a subframe portion for carrying the motor and transmission. In order to use full-elliptic springs in the rear and have a low body carriage, the rear end of the frame is upswept over the back axle.

Mason a Product of a Kansas City Factory

The Mason car, hailing from Kansas City, Mo., is one of those robust two-cylinder constructions with opposed motor carried longitudinally amidship at the left side and delivering its power through a two-speed planetary gearset and single chain to the rear axle. Although of that early all-American design, the car merits particular attention because of the staunch work it has done in contests during the past summer. Its motor, rated at 24-28 horsepower with 5 by 5-inch cylinders, has the valves placed in the cylinder heads and operated by vertical rockerarms in conjunction with horizontal push rods paralleling the cylinders on the top. This construction places the camshaft with push rods in the upper part of the crankcase, which housing is split horizontally in the crankshaft plane. The motor is supported beneath a couple of channel cross pieces of the frame, four bolts holding it. The cylinders are bored and ground to a glass finish, the valves are one-piece nickel steel forgings and the crankshaft is a nickel steel forging running on Parsons white bronze hand-scraped bearings. Of the moving parts, pistons carry three lap-jointed compression rings carried outside of the wristpin. The connecting rods have marine endings at the crankshaft ends and the wristpins are hollow members. A compression relief is furnished by which the exhaust valves are held open by small cams to facilitate starting. This compression relief takes the form of a sliding fork in the left end of the crankcase, the fork spanning the camshaft and having a cone face bearing upon a shoulder on the shaft whereby the shaft is moved endwise in order to bring into operation the miniature compression relief cams. A notable feature in connection with the car in conjunction with its planetary transmission is the use of a cone clutch in the flywheel, whereby the engine can be disconnected by pedal, at which time a brake is applied upon the rear axle. This allows of bringing the car to a dead stop and then by releasing the pedal dropping into high speed without changing speed. The side lever controls the high and low speeds and when pushed back applies the brake on the rear axle, and which is self-locking, enabling the driver to stop on any hill whether going up or down. This brake is released by pressing the heel on a plunger rod in the footboard. The transmission has a 2-inch band for low speed and a similar band for reverse. Ignition is by two sets of dry cells; the cooling system consists of a water circulation with a sliding vane pump. Lubrication is by a Hill oiler located on the top of the crankcase and with leads to the cylinders and crankshaft bearings. Combined in the running gear are: A framework made up of steel angles and channel steel riveted together and reinforced by bracing; full-elliptic rear springs; straight tubular front axle and wheels 32 inches in diameter carrying 3½-inch tires. The general layout and style of the car are the same as during the past season, the wheelbase, wheels, springs and frame not having been altered.



CONTINENTAL, A ROADSTER MADE IN CHICAGO

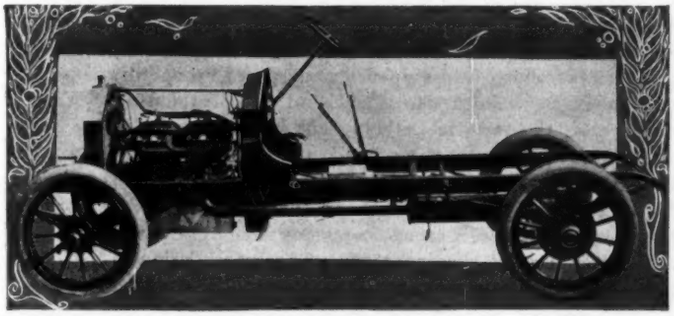


RIGHT SIDE OF THE C.-F. CHASSIS

Lorraine a Product of a Chicago Factory

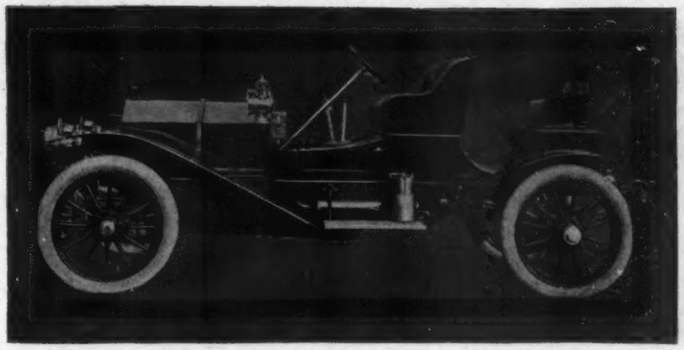
In the Lorraine car, one of the many Chicago products to make its appearance, are two characteristic features, a special self-starter and a peculiar style of elastic driveshaft, whereby the sudden starting of the motor is absorbed before it reaches the tires and conversely whereby the sudden breaking is absorbed before it reaches the transmission set or motor. By way of introduction it will suffice to state that the Lorraine car is shown in two models. One is a two-cylinder style with an opposed motor under the hood. The big car, a 50-55-horsepower machine, is fitted with a Continental motor. The motor has 5 by 5-inch cyl-

inders and follows that style with twin castings, having valves on the left, enclosed half-time gears and two-part crankcase, with crankshaft carried on three bearings. In the bottom of the crankcase is a basement compartment or oil reservoir, from which the oil is forced by gear pump to the several motor parts. The self-starter fitted, known as the Hobbs, named after the inventor, is an auxiliary motor operating directly on the crankshaft at right angles and placed between the clutch and transmission. It consists of a cylinder with piston, the rigid piston rod having its under surface in the form of a rack for meshing with a gear on the crankshaft. Air pressure obtained from the exhaust is carried in a tank under the chassis, where 80 pounds' pressure is available. With this air pressure it is possible to have from sixteen to twenty starts without hand cranking. In using the starter it is but necessary to turn a lever from the car seat, which action works a three-way valve, allowing the air to enter the starter cylinder and force the piston outwards, at which time a part revolution is imparted to the crankshaft. The starter includes arrangements whereby back firing or other motor inconsistencies do not injure it. This starter was tried out in 1903 and has been in constant use on a few cars ever since. The car has two ignition systems, one with current supply by special dynamo or two storage batteries and an automatic cutoff on the dynamo. The other set is a Simms-Bosch high-tension magneto. The clutch is a standard cone design, with leather covering.



LEFT SIDE OF THE C.-F. CHASSIS

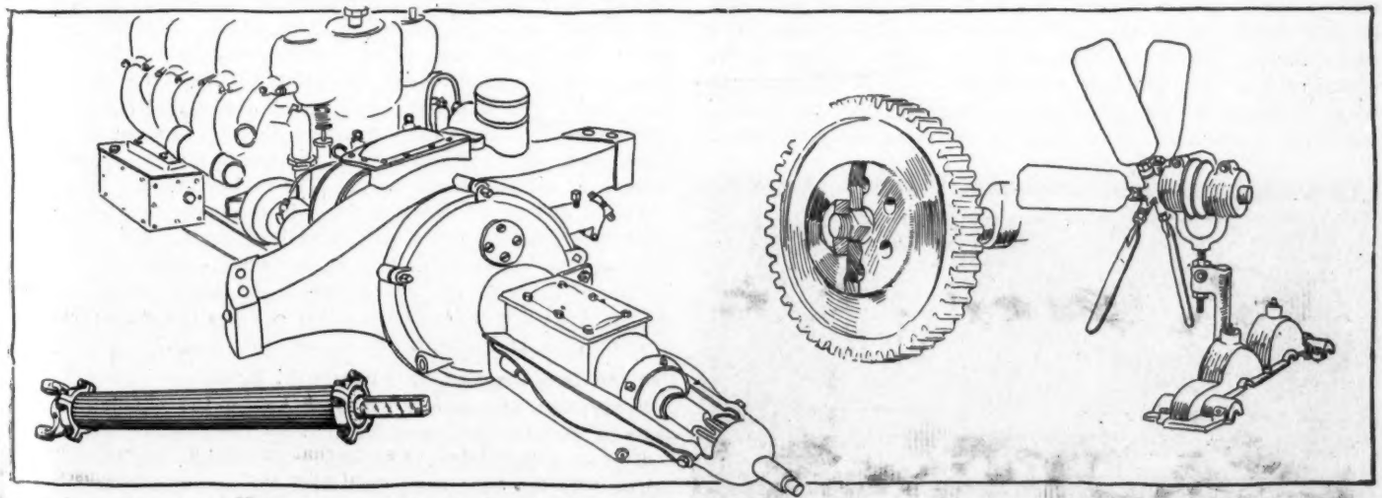
Speed variations are through a sliding or selective gearset, with chrome nickel steel gears and shafts and Hess-Bright bearings. The Hobbs elastic shaft consists of a series of spring steel rods concentrically arranged, with one end attached to the driving element and the other to the driven element, with an intervening clutch to carry the load on a rigid shaft, when the torsion of the roads reaches a fixed limit. It has twenty-four $\frac{5}{16}$-inch rods, with the ends stamped into prismatic shape and gripped into the serrations of two wheels, keyed respectively to the driving and driven ends of the divided driveshaft. The rods are gripped into the serrations by means of segmental straps bolted together. Due to the use of a large number of steel rods, the shaft equalizes the torque and saves the gears and tires being subjected to excessive strains. It is not heavy and its presence is scarcely noted by the casual observer on the driveshaft. The Lorraine running gear is equipped with triple-action springs, irreversible steering gear, chrome nickel steel I-beam front axle, floating rear axle with chrome nickeled parts and ball bearings and emergency and foot brakes on the rear wheels. Tires are 36 by 4½ inches front and rear.



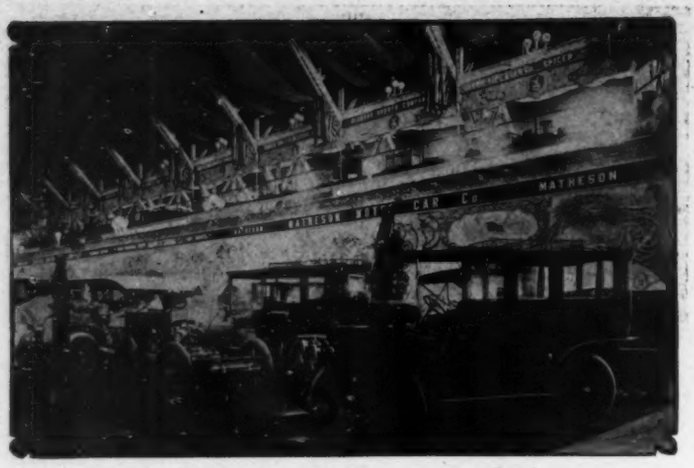
PUNGS-FINCH WITH A ROADSTER BODY

Price Is One of the Motor Buggy Novelties

One of the novelties in the motor buggy class is the Price car, built by a Chicago enthusiast. This machine has as its leading feature belt-drive transmission, in which there is not a single gear used other than the bevels for transmitting from the propeller shaft to the rear axle. The motor is a two-cylinder air-cooled one rated at 10 horsepower and with cylinders measuring 3⅛-inch bore and 3½-inch stroke. It is mounted with the cylinders placed transversely in front and having the flywheel at the forward end of the crankcase. The usual features of battery ignition, lubrication by an Essex compression grease cup and float feed carbureter are in place. Motor cooling is by cylinder with integral circular flanges assisted by the draft created by the propeller spokes of the flywheel. In the transmission portion the crankshaft is continued to the rear, carries a two-size wood pulley, the first of small diameter and the second of considerably greater diameter. In the vertical plane beneath these pulleys are two others, carried on the forward end of the propeller shaft from the rear axle. A broad leather belt 6 inches wide passes over these pulleys. On low speed the belt passes over the smaller pulley on the engine continuation shaft and the larger diameter pulley on the forward end of the drive shaft, whereas on the fast or high forward drive the belt travels over the large pulley on the engine continuation shaft and the small pulley on the propeller shaft. When shifting the belt is slipped backward or forward from the different sized pulleys by a shifting mechanism operated by side lever, and when it is being shifted the pulleys are brought closer together, permitting of considerable slack in the belt. Re-

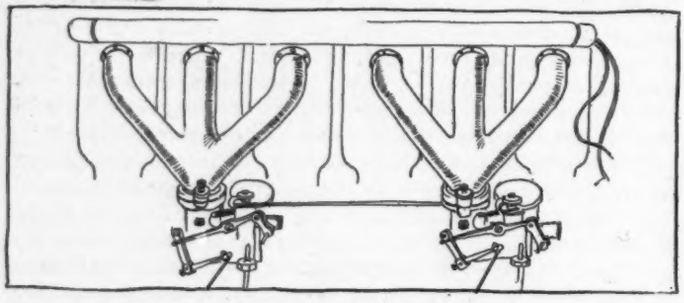


HOBBS ELASTIC SHAFT ON LORRAINE, MONARCH ENGINE, C. V. I. TIMING GEAR AND MOTOR FAN



In the Coliseum—The Stand of the Matheson

verse drive is not through the belt, but rather through a wood wheel formed integrally with the forward end of the first wood pulley on the motor continuation shaft. This pulley has a ridged rim which fits into a recessed rim of another pulley on the forward end of the propeller shaft, so that by swinging the propeller shaft upwards it contacts and gives a friction drive. As to the possible wear on this belt, Mr. Price asserts that the present one has run a great many miles and from inspection it is in good shape, the leather in it being a good quality of hide. In other respects the little Price car is conventional, except for the three-quarter elliptical front and rear springs and the angle frame, to

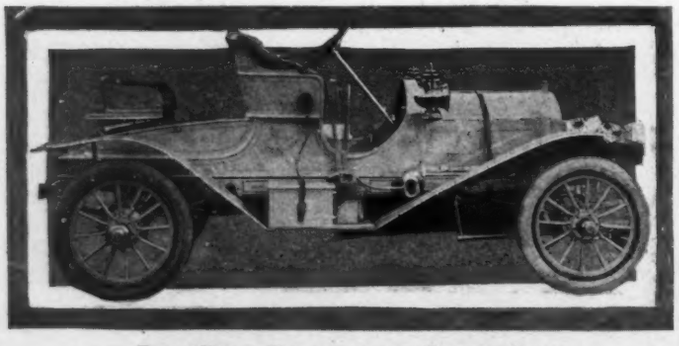


Double Carbureter on Tincher Six

the side of which is bolted a heavy wood construction. The wheelbase measures 98 inches.

Tincher Six One of Most Powerful in the Show

Seen for the first time at a motor show is the 50-60-horsepower Tincher four-cylinder car, described fully in a June issue of Motor Age. Also seen is the latest Tincher six, which, with a rating of 90 horsepower, is one of the most powerful cars in the show. Since the inception of the Tincher car and through its various car designs high power has been a paramount point and in this regard the present cars are not disappointments. The four-cylinder Tincher possesses not a few motor characteristics, conspicuous among which is the use of an overhead camshaft with a housing for the valve parts on each cylinder pair. Also not to be overlooked in the design is mounting the magneto at



Pungs-Finch Roadster with Rumble Seat

the left front with its armature shaft lying crosswise of the car and taking its drive from the vertical end shaft for driving the camshaft. Also grouped around the front of the forward cylinder is a rotary water pump. The cylinders have a 5-inch bore and 6-inch stroke and the use of separately-cast cylinders shows the concern's faith in this construction for high-powered cars. In opening the overhead valves a peculiar double rocker arm construction has been followed. The intake and exhaust cams are side by side on the shaft and resting over them like the side of an A are rocker arms, one bearing on the exhaust cam, the other on the intake cam. These arms at their apex ends attach to long hubs, on the other end of which are horizontal arms for bearing on the tops of the valves. The hub portion of one arm is a sleeve surrounding the hub part of the other arm. Apart from the motor's general design there are many points that have come under the designer's microscope, notable among which is the use of large-diameter intake and exhaust valves forged from nickel steel; the use of a Krupp chrome nickel steel crankshaft polished all over and with a 2-inch diameter and the employment of semi-steel pistons carrying five compression rings. The carbureter, a Tincher design, has the gasoline needle valve interconnected with the mixture throttle, whereby the flow of gasoline is in proportion to the mixture demand by the motor. In the first Tincher cars an auxiliary mixture system was installed for keeping the motor barely turning over when standing by the curb, but it has been discontinued in the latest creations. The Tincher clutch, carried in a small-diameter drum forming a rearward extension of the flywheel hub, is a contracting band of great width which seizes upon a manganese bronze drum carried on the transmissionshaft. The band is contracted by a rack and sector, the rack teeth being cut longitudinally in the outer surface of the contracting band and the sector being rotated by an engaging cone pressing against a lever on the sector axis. Speed variations come through a four-speed selective set which incorporates in the rear of its casing the differential gear and the center part of the jackshaft. The transmission is a chrome nickel proposition with gears and shafts made from the Krupp product and cut and finished in the Tincher plant. The case is an aluminum casting divided horizontally in the bearing plant. It carries annular ball bearings for all the shafts. Emergency brakes are expanding manganese bronze shoes acting within rear wheel drums and regular brakes are clamping bands lined with camel's hair and acting on the same drums that the emergencies expand within. Front and rear axles are Krupp chrome nickel forgings and the springs are made from the same metal. In a like enumeration might be noted the employment of this metal in the steering gear parts, in the camshafts of the motor and in the differential gears. It is the six-cylinder Tincher that draws the crowds and because of the fact that this car is but an augmentation of the four little need be said concerning it. Its separately-cast cylinders are the same as those used on the four but its rating is placed at 90 horsepower. When intended for a roadster body the wheelbase measures 127 inches and for touring car purposes it is lengthened to 140 inches. Featured on the motor is the employment of two carbureters, one for feeding the three forward cylinders and the other for the three rear ones. Each carbureter is carried well up on the cylinder heads and delivers mixture to its three cylinders through as many radiating pipes, each pipe representing the shortest distance between the carbureter and the intake valve. The carbureters are controlled in unison and as the order of firing in the motor is 1-5-3-6-2-4 it can be seen that there is a pull on each carbureter and that at no time are two cylinders pulling on the same carbureter. Except for the addition of the two cylinders and the extra carbureter, the Tincher six is much like the four and has the same style and size of clutch, transmission, drive and other parts.

Oakland Is a Creation by Allanson P. Brush

A car that few people heard of before the opening of the show is the Oakland, manufactured by the Oakland Motor Car Co., of Pontiac, Mich., and after the design of Allanson P. Brush, who has been connected with the motor industry by being associated in the design of the Cadillac single-cylinder car

and the Brush runabout of Detroit. The Oakland, his latest effort, is a 20-horsepower two-cylinder engine, with vertical cylinders cast as a unit and mounted under the forward bonnet, with the crankshaft longitudinally of the car. Conspicuous in the motor is the fact of there being but one throw to the crankshaft, so that both pistons move up and down in the cylinders together. They do not fire simultaneously, but on alternate downward strokes. In order to balance the motor to eliminate vibration there is a cylindrical expansion at the right of the crankcase, and in this is a shaft gear-driven from the crankshaft and carrying a balance weight which is said to be the eliminator of motor vibration. The carbureter on this car is without the usual float feed and without a needle valve. On the right side of the engine is the diaphragm pump, operated by the exhaust pressure and which pumps the gasoline from the tank under the body to a chamber in the carbureter. From this chamber all excess gasoline is returned to the tank, the overflow pipe maintaining a constant level, the same as a float does in a float type carbureter. The transmission is of the planetary type, giving two forward speeds and reverse, and is connected to the driveshaft underneath the body. It is completely housed in an aluminum casing. Featured in it is the operation of the two forward speeds and reverse on a selective principle, whereby it is possible to pass from top speed to reverse without going through low. An attractive construction in it is the elimination of brake bands for obtaining the different speeds and the use of clutches within the housing, the clutches operating constantly in oil. Cooling is by the thermo-syphon system, with a large intake pipe from the radiator base to the bottom of the waterjacket at the front and a return water pipe from the top front of the jacket to the radiator top. The running gear includes in its makeup such features as a wood framework with rod trussing; straight tubular front axle with wheels carried on ball bearings; live rear axle; semi-elliptic front springs and full-elliptic rears; 96-inch wheelbase; standard tread and 30 or 32-inch tires of the 3½-inch clincher size. As a touring car the vehicle weighs 1,700 pounds and as a runabout 1,600.

Makers of the Halladay Show Their New Model

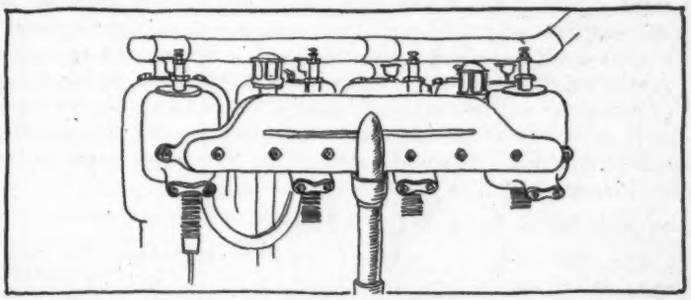
Made by the Streator Motor Car Co., Streator, Ill., the Halladay car comes as one of the new faces yet brings but few new constructions, the makers preferring to use tried and tested parts rather than indulge in costly experimentation in the realm of the unknown. Consequently on lifting the bonnet it is not surprising to find in place a four-cylinder Rutenber motor rated at 35-40 horsepower and with power communication through a leather-faced cone clutch, sliding gear transmission and final shaft-drive to a floating rear axle. A Schebler carbureter feeds the cylinders, taking its gasoline supply from a 15-gallon tank. A Hill Precision oil lubricates the motor parts and maintains a splash within the crankcase. A storage cell delivering its current through a multi-unit coil is the current source in the jump spark ignition system and motor cooling is conventional, necessitating the use of a gear pump and a Long copper tube radiator. In the running gear are combined the usual pressed steel frame, internal and external brakes on the rear hubs, half-elliptic springs, I-beam front axle, 34-inch wheels with 4-inch tires. The body, made of laminated wood and for five or seven passengers—revolving seats when desired—is of the straight line variety, with individual front seats, hollow metal dash and the usual lamp equipment.

Monarchs Are Now Four-Cylinder Cars

Monarch cars, which for the past 2 years have been small-sized two-cylinder air-cooled products, have for next season been entirely discontinued in this form, having developed into four-cylinder water-cooled machines, with selective transmission, magneto ignition, shaft drive and all the other accompaniments of this construction. They appear in two models, a racy style of roadster and a five-passenger touring car. Of paramount importance is the unit power and transmission system, as well as the supporting of this on a three-point suspension. The crankcase is made with a pair of stout lateral arms at the rear, which extend to the side pieces of the frame, whereas in front it is supported

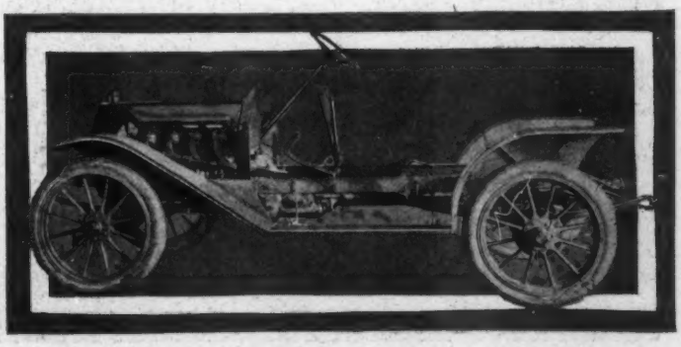
NORTHERN END OF COLISEUM—APPERSON EXHIBIT

on a single point, it being the apex of the triangular support. In order to make the job more commendable half-time gears have been placed at the rear of the crankcase in an expansion between the end of the crankcase and the supporting arms, while in the supporting arms is sufficient space for the flywheel, which is entirely encased. Bolted immediately to the rear of the supporting arms is the transmission case and secured to the sides of it are brackets which support the globe ending of the forward end of the propeller shaft casing. Making the two supporting arms very stout and hollow gives ample strength. Carrying all of the motor accessories, such as water pump, half-time gears, dis-

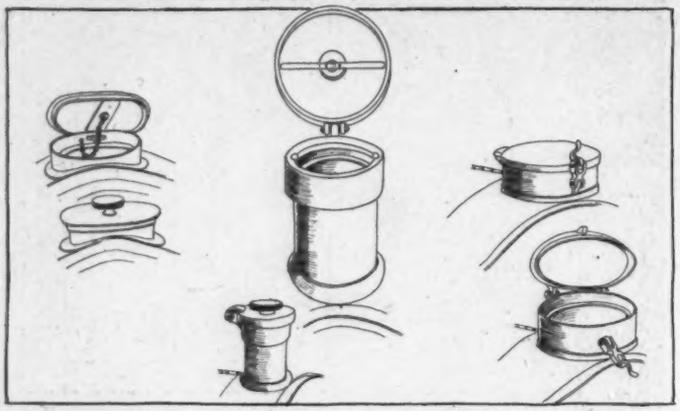


INTAKE OF THE MONARCH ENGINE

tributer and magneto adjacent to these supports reduces the weight of the forward end of the motor considerably, thereby providing a better balance between the motor on the front side and the transmission on the rear side of this support. The motor, rated at 40 horsepower, has separately-cast cylinders with opposite valves, the bore and stroke of each being 4¾ and 5 inches, respectively. On the rear left is the large centrifugal water pump just in front of the motor support arms, and on the right the commutator is carried on a short vertical shaft encased in the motor arm, so the distributer appears but a small expansion on the top of the arm. The magneto bed is attached immediately in front of this arm at the right. At the forward end is a gear-driven fan for assisting the water circulation and cooling of the motor. Something novel in an intake pipe is shown, consisting of



CHASSIS OF THE MONARCH ROADSTER



VARIOUS STYLES OF RADIATOR CAPS—RAINIER, PACKARD, STODDARD

a double piping lying alongside of the valve chambers and having a lower portion the entire length of the motor and an upper portion approximately three-quarters of this in length, the design being not unlike that used on several six-cylinder makes. These pipes, instead of being round in cross section, are flat, with the vertical measurement the greater. The oiler is carried on the left front and driven by spur gear from the camshaft. The flat tube radiator is conspicuous in that its framework is a regular octagon; but the visible tubular portion is a circle because of a brass strip lying within an octagon and having a circular opening. The rear axle is a floating construction supported on Timken rollers. Conspicuous in the running gear is the tubular front axle, and the downwardly curved spring horn attached to the rear ends of the frame. The forward ends of the rear semi-elliptic springs are shackled to the frame horn through a crescent-shaped shackle, which has a rearward continuation in the form of a strut or radius rod extending to the rear axle. The forward ends of the front springs attach to a bolt passing through the end of the frame and the center of the leaf is cut away where the frame attaches to the bolt.

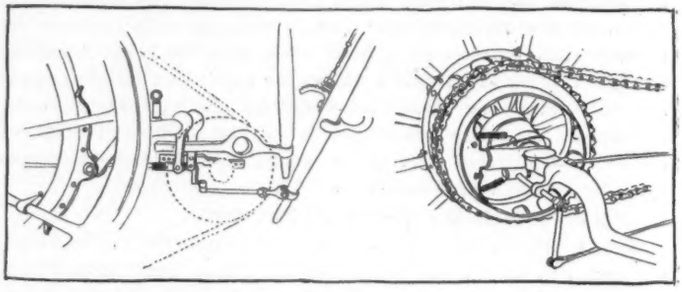
Friction-Driven Cartercar Is Unchanged

The friction-driven Cartercar has been unchanged, the company satisfying itself with retaining its present style of friction transmission and not changing its motor, wheelbase or running gear construction. A new model has been added, however, in the three-passenger roadster style, which is built on the standard chassis. The Cartercar motor is a 24-horsepower two-cylinder opposed one, mounted transversely in front and with a flywheel in the rear of the crankcase. The friction transmission consists of a large aluminum alloy disk on a longitudinal shaft and a sliding friction wheel operating on the face of the disk and carried on a rigidly supported jackshaft. Drive is by single chain to the rear axle. Friction contact between the disk on the longitudinal shaft and the wheel on the cross shaft is by forcing the disk back against the wheel. This calls for a sliding union between the longitudinal diskshaft and the engine flywheel which is obtained as follows: On the rear face of the flywheel are three metal studs of rectangular cross section, measuring 1½ inches by ¾ inch. These three are distributed on the flywheel face as the three angles of an equilateral triangle, the crankshaft being the center of the triangle. On the forward end of the longitudinal shaft carrying the friction disk is a three-arm spider with slots for receiving the flywheel studs. These slots are provided with adjustable fiber bushings so when the friction disk with its shaft is carried rearward the spider slides backward on the flywheel studs, they being of a length sufficient for the short longitudinal movement of the diskshaft. This transmission is very similar to the Earl excepting in the method of union between the diskshaft and the flywheel. In other respects the Cartercar is a conventional construction with pressed steel frame, semi-elliptic springs, divided live rear axle with Brown-Lipe differential, tubular front axle with Elliott steering knuckles, front wheels carried on ball bearings and expanding brakes in the rear wheel hubs.

LOCOMOBILE EXHIBIT IN THE COLISEUM

Reliable-Dayton and Its Several Features

The Reliable-Dayton is a full-fledged touring car or runabout fitted with 40-inch wheels in front and 44-inch wheels in rear, carrying 1¼-inch Firestone solid side wire tires in front. This is one of the very few motor buggies which has a band clutch acting on a drum on the rear face of the flywheel and also has a sliding gear transmission, giving two forward speeds and reverse and carried integrally with the jackshaft housing. In brief, the Reliable-Dayton with its flywheel clutch and sliding transmission is undoubtedly a full-fledged car and would be classified as such were it not for its high wheels and solid rubber tires. The 15-horsepower motor, mounted transversely in front, has water-cooled cylinders with 4⅜-inch bore and 4¼-inch stroke. The motor follows that design with cylinders having valve chambers on top of the heads, in which are carried the mechanical intake and exhaust valves. Water cooling reposes with a horizontal tubular radiator of the basement style—one of those carried beneath the car framework in front. The motor accompaniments consist of a mechanical oiler working in conjunction with a splash system, jump spark ignition with dry cells as the current producers, float feed carburation and additional cooling by means of a water tank carried beneath the bonnet on the forward side of the dash. The flywheel clutch is an external band lined with camel's hair belting and operated by a pedal. It connects by shaft with a sliding gear transmission. To appreciate more fully the transmission system bear in mind that the jackshaft is entirely encased in a large one-piece aluminum casting supported beneath the frame side pieces and heavily webbed, so that its forward webbing in the center forms an expansion serving as the lower half of the transmission case. Suitable covers are provided for the differential gear and the transmission set. Between the jackshaft housing and the rear axle are radius rods with turnbuckle adjustments. Steering is through an ingenious and very simple rack and pinion gear. The car control is centered in a vertical column at the right side and in this column is a shaft with horizontal steering lever on the top and pinion on the bottom. This pinion meshes with a horizontal longitudinal rack which connects by ball joint which

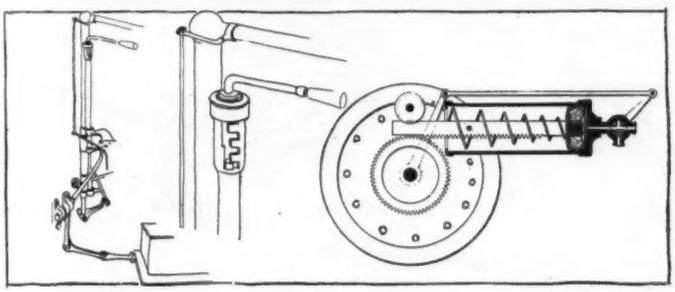


BRAKES ON THE DUER AND STAVER

is practically continuous with the rod connecting to the steering knuckle. On the steering column—Pierce fashion—is a horizontal lever for change speeds and close at hand on the column also are spark and throttle controls. In the running gear are carbon axles with Timken roller bearings, trussed wood frame, 84-inch wheelbase and full-elliptic springs in rear.

Pungs-Finch Cars Come in Two Models

Pungs-Finch cars are exhibited in two models, a 40-horsepower four-cylinder roadster and a 50-horsepower seven-passenger touring car. In general design both cars are very much alike, differing only in the size of parts, wheelbase, wheels and other details. The Pungs-Finch motor follows that accepted style in which the cylinders are cast in pairs, with opposite valves opened direct from lifter rods operated through a camshaft enclosed within the crankcase. On the cylinder heads are oval plates forming waterjacket caps. Both cars are fitted with storage battery ignition, but the provision is made for adding a magneto when desired. The structural design of the motor presents no characteristics. The timer is carried on the top of the vertical shaft at the left front. Lubrication is by a six-feed Manzel lubricator placed on the dash. Carburation is carried on through a conventional float feed design and cooling is by means of integral waterjackets with radiator and forced circulation. Both cars employ a multiple disk clutch, which, instead of being carried in a tubular hub extension on the rear face of the flywheel or in a separate compartment in the forward end of the gearcase, is placed in an intermediate aluminum housing, the top half of which is removable, and which makes the clutch particularly accessible. It contains seventeen disks, 18 inches in diameter, and made from Jessop steel. They operate in oil. Between the clutch and transmission shaft is a knockdown joint to facilitate clutch removal. Speed variations are through a selective gearset, giving three forward variations. Both shafts in the gearset as well as the front road wheels and the rear axle are carried on Hess-Bright bearings. Braking is through double sets on the rear axle, outer band brakes of Raymond manufacture and expanding metal brakes working within the same drums. The rear axle is a floating construction. The roadster has 106-inch wheelbase and 32-inch wheels, while the big car has a wheelbase 10 inches longer and wheels 2 inches greater in diameter. Both motor and transmission are carried on a sub-frame.

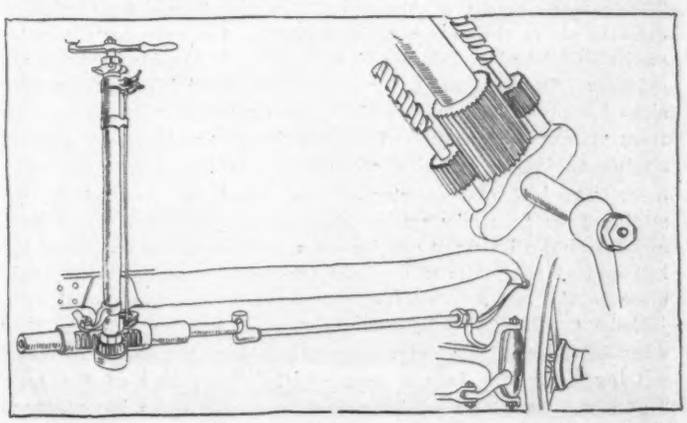


COLUMBUS GEAR CHANGE AND HOBBS STARTER ON LORRAINE

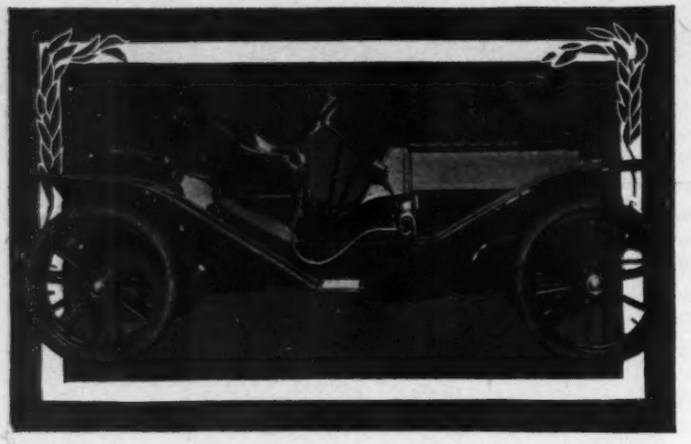
Duer Using Selective Bevel Gear Transmission

In most respects the Chicago Coach and Carriage Co. in its Duer motor buggy has retained its design of a year ago and in its Duer buggy the characteristic feature lies in the use of a selective bevel gear transmission incorporated in the jackshaft, together with the sliding of that jackshaft forward and back—back to slacken the driving cables when shifting gears and forward to tighten the cables when the gears are meshed. This sliding of the shaft with the transmission makes the Duer different from many of the other motor buggies. In the Duer the apparent aim has been to provide a motorized buggy with the transmission advantages of the selective set and yet combining the simplicity of the cable drive. The motor, rated at 12.3 horsepower at 750 revolutions, is positioned transversely in front under the bonnet with the flywheel in front of the crankcase and serving as a fan for inducing an air current. The motor has its two cylinders and the connecting crankcase cast integrally, the cylinders having aligned bores and made with heads that screw into place. To accommodate the crankshaft to this construction the connecting rods are slightly offset. Surrounding each cylinder wall are integral cooling flanges. An improvement—at least a change considered an improvement—is the taking of the oiler off the rear of the dash and locating it over the center of the crankcase, where it is adjacent to the parts calling for specific lubrication and where short leads suffice, one to the left cylinder and the other to the crankcase, the right cylinder being without an oil lead, due to the fact that the direction of revolution of the crankshaft tends to splash the oil into that cylinder. A peculiar three-point suspension of the motor is accomplished by supporting the end of each cylinder on the side member of the frame and placing the third support in the form of a tube extending from the head of the left cylinder forward to a cross piece of the frame. Congregated in the ignition system are ten dry cells, a wipe timer of the company's manufacture and a two-unit coil. A Breeze carbureter supplies mixture. Coupling the motor with the transmission is a driveshaft with a slip joint to allow the gearset with the jackshaft being slipped forward. The transmission consists of two bevel pinions on the end of the driveshaft and a pair of opposing bevels on the jackshaft. When driving into one bevel forward drive is obtained and reverse is secured when driving into the others. The opposing bevel gears on the jackshaft are slipped on the shaft in unison. Control of all speeds is in a side lever which works in a forked quadrant. In place of rear semi-elliptic springs are full-elliptics. Brakes are hose lengths brought into contact with the cable pulleys on the back wheels, and the frame is a wood construction reinforced with rocker plate secured thereto by bolts and screws. The driving cables used are of two varieties, one consisting of a square chain built up with Gandy belting and the other an elevator cable built up with the same belting. As a surprise to its many friends, the company on the Monday of the show placed in the exhibit space a chassis of its four-cylinder car, rated at 22-24

WHERE THE NORTHERN HOLDS FORTH



STEERING GEARS ON THE RELIABLE DAYTON AND MONARCH



TINCHER IDEA IN ROADSTER FORM

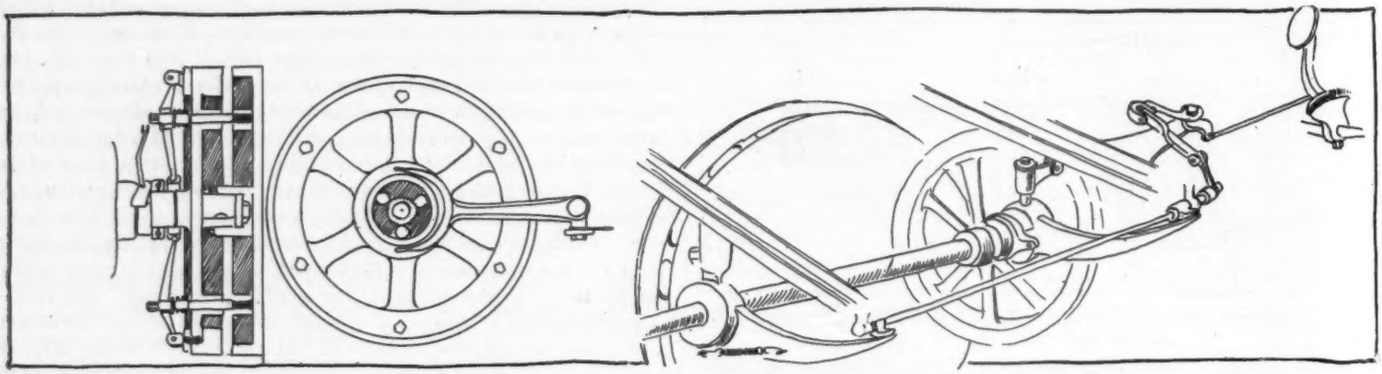
horsepower and having its cylinder mounted in V form like the Marmon air-cooled cars. Each cylinder has a 4-inch bore and stroke and the motor complete weighs only 90 pounds more than the two-cylinder style. It is intended to be interchangeable with it so that those desiring a four-cylinder motor buggy can have one, whereas the buyer preferring a two-cylinder one can have it on the same chassis. The cylinders of the four-cylinder V style have exhaust valves in the cylinder head operated through rocker arms. The intakes are in offsets on the cylinder sides and opened by short push rods. The motor has a three-point support, two at the forward end on a transverse tubular support which passes through eyeholes in the forward end of the crankcase and a trunnioned support on the rear end.

High-Wheeled Columbus Motor Buggy Shown

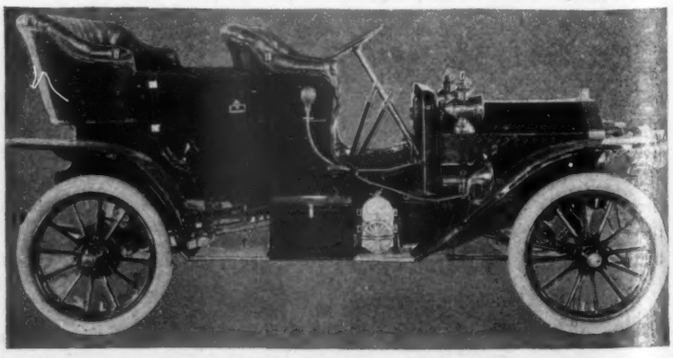
While devoting its entire attention to the production of electric cars in the past the Columbus Buggy Co. has departed from its beaten path by producing a motor buggy of the high-wheel class, its front wheels measuring 42 inches in diameter, its rear wheels 46 inches. Both sets are shod with 1⅜-inch solid rubber tires. The general layout of the chassis, when viewed from a point directly above the center of it, shows the two-cylinder air-cooled motor positioned in the rear right quarter of the chassis with the cylinder lying longitudinally and the flywheel in the form of a siren blower on the outside of the crankcase so it draws cool air from under the right side of the car frame and throws it upward against the motor covering, whence it is refracted onto the cylinders. The left rear quarter of the chassis is occupied by the sliding gear transmission, which case is formed integrally with and forming a leftward continuation of the crankcase. From the left end of the mainshaft of the transmission, drive is by chain close to the left side of the car frame to the differential on a jackshaft. From this jackshaft side chains transmit to the road wheels. Thus in this motor buggy the complete power and transmitting parts are in the rear of the front line of the seat. To make them pre-eminently accessible the designer has mounted them on a separate frame extending from the rear to the middle line of the car, making it possible to remove this frame with the motor, transmission and jackshaft. Car control centers in a vertical column at the left end of the seat. On the top is a cross lever for steering, but beneath is a shorter lever for working the clutch and changing speeds. Using a sliding gear transmission necessitates a clutch and instead of placing this between the motor and gearset, the maker has inserted it between the differential sprocket and the differential housing whereby the motor, running detached from the wheels, drives to the jackshaft. On the control the lower lever when moved forward operates the clutch but this lever also has three vertical positions, for high, low and reverse speeds, respectively, when going from the bottom up. Raising this lever to enter the different notches works a crank on the end of a shaft extending backward to the gearset and on the rear end of this shaft is an arm for connection to the sliding units in the gearset. The buggy has three brakes, one a band acting on a transmission drum and the other steel shoes bearing on the rear wheel tires. Both sets are applied by pedals. Careful construction appears in the use of radius rods between jackshaft and rear axle for chain adjustment as well as in the frequent positioning of grease cups. A phaeton style of body is added, with a false front radiator.

Staver Motor Buggy Is a Chicago Product

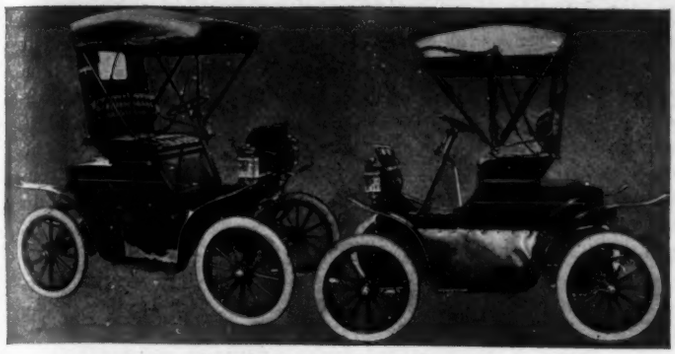
The Staver motor buggy—a Chicago product and one of the high-priced vehicles of this type—has been changed but little externally since it made its appearance at the armory a year ago, but it has been entirely redesigned when the motor and transmission parts are surveyed. During the past year this car has made itself familiar with the Chicago public and its changes should secure it a still more favorable patronage for the approaching season. The body of the stanhope type remains and is easily distinguished by the flaring leather dash, fashioned largely after the style employed on horse vehicles. The body work and finishings are par excellence for a vehicle of this class and every detail of the equipment has been closely attended to. Its power plant is a 20-horsepower Westfield motor with 5 by 5-inch water-cooled cylinders opposed and carried on the right side of the chassis well to the rear, so that the head of the back cylinder extends



SCHACHT FRICTION DRIVE AND THE ROCKFORD FRICTION DRIVE



MOLINE MODEL OF TOURING CAR

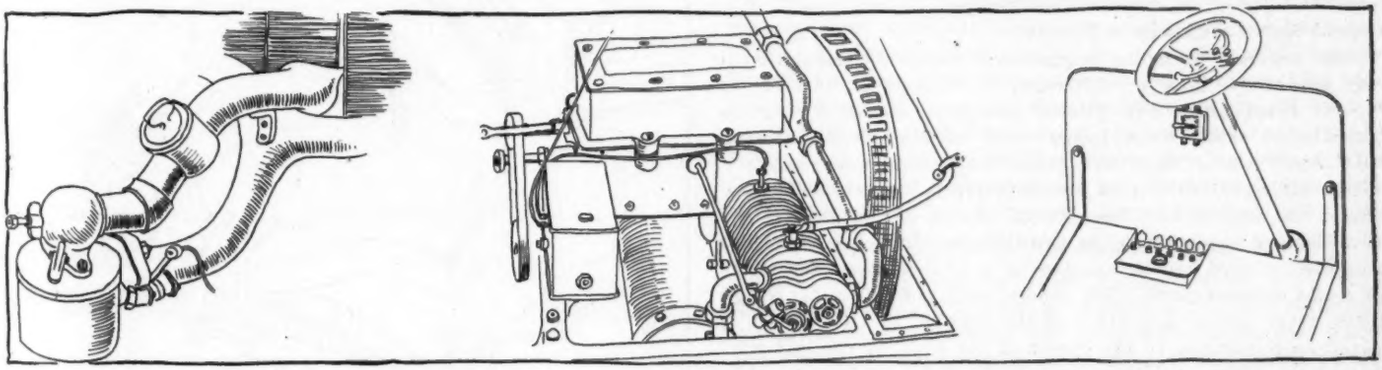


TWO VIEWS OF THE JEWEL BUGGY

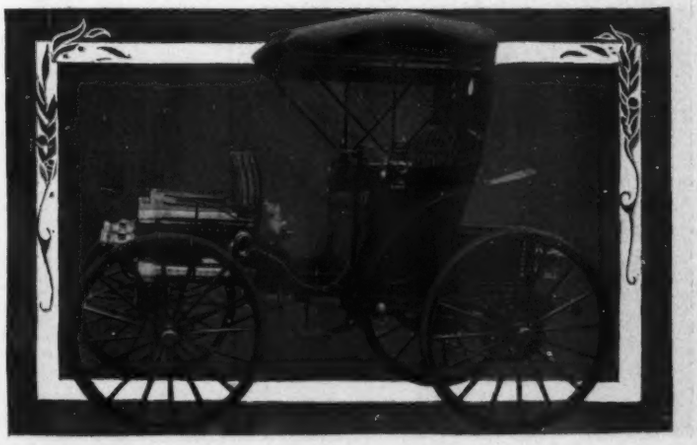
to the rear of the body and the head of the front cylinder is beneath the seat. Access to the motor and its many parts is by cover on the rear part of the body, as well as removing the board at the front of the seat. In connection with the motor attention is directed to the circular shape of the crankcase cover and the enormous size of it, as well as its attachment by four swinging bolts with thumb nuts, these bolts swinging into slots in the cover, thereby permitting of the removal of the cover without taking the thumb nuts off but simply loosening them. With the crankcase cover removed the camshaft and four push rods for the valves are exposed. Also novel is the Staver's oiler, a vertical cylinder of large diameter placed in the angle between the rear cylinder and the crankcase. This oiler with six leads has but a single plunger pump which is driven by worm and shaft from the camshaft. The oiler leads connect with the usual portions of the motor. The self-starter of last season has been dropped and now cranking is done from the center of the right side through a ratchet arrangement. The improvements of the car have not all been confined to motor changes, the running gear figuring prominently by means of a longer wheelbase, heavier wheels, heavier tires and axles and the substitution of full-elliptic rear springs where semi-elliptics were used. The transmission from the motor is by chain to a countershaft located forward of the crankcase and from this communication is by side chain to the rear wheel. The one set of brakes employed are expanding fiber members operating against drums within the rear wheel sprockets. Axles are regular Timken constructions and roller bearings carry the jackshaft. Control on this car is on the left side and is confined to a vertical column with horizontal lever for steering. Spark and throttle controls are carried on this column. The equipment furnished consists of two oil lamps for the dash, two gas headlights, a tail lamp, horn and full leather top. The Staver is made in one model only.

Three-Point Suspension a Pullman Flyer Feature

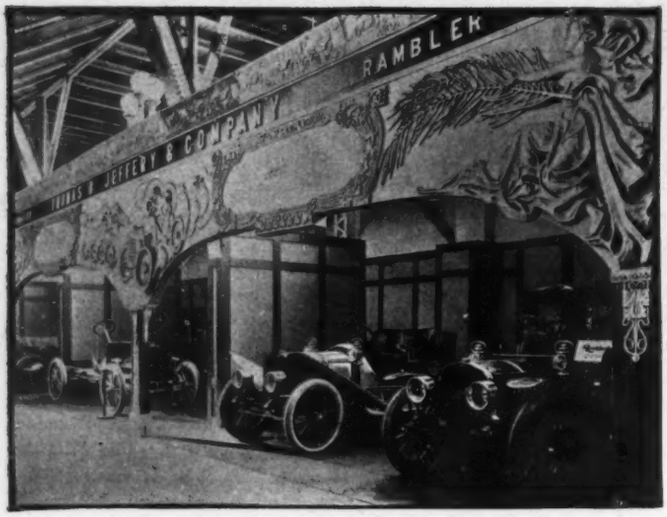
Chicago makers are well represented at the Coliseum show, several new cars appearing, one of which is the Pullman, built by the Pullman Motor Car Co. It is a powerful machine of the four-cylinder four-cycle style, having cylinders cast in pairs with opposite valves, dual ignition, contracting band clutch, selective transmission, shaft-drive and floating rear axle. The unconventional feature of the motor is its three-point suspension, consisting of a stout integral arm at the rear of the crankcase at each side and a central trunnion support on the cross piece of the frame in front. The front end of the crankcase rests on a horseshoe-shaped forging, with the curved end to the front and fitted with an eyehole for swinging on a bolt in the cross piece of the frame. The support is not unlike that used on C. G. V. cars. In other respects the motor follows regular lines and is a well-laid-out power plant, having the magneto at the right opposite the front cylinder pair, the carbureter behind it and the commutator on the top of a vertical shaft on a level with the cylinder heads and in the space between the castings on the right side. The motor is claimed to develop from 50 to 60 horsepower with its 5¼ by 5½-inch cylinders. Lubrication is through a six-feed belt-driven oiler located low down on the dash so only the sight feeds appear above the sloping portion of the footboard. The oiler is of standard multifeed construction and is belt-driven. The clutch is a steel band which contracts over a bronze drum and is enclosed and operates in oil. The selective transmission affords four forward speeds with direct on the third and has gears and shafts made from chrome nickel steel. Shafts are carried on F and S ball bearings and the shifting mechanisms are entirely enclosed. The gearset is a heavy construction, reminding the observer of the foreign style in that the case is large and the shafts placed side by side. It has a three-point suspension. Five brakes are fitted—two internal members on the rear wheels, two contracting brakes operating on the same drums for emergency use and one transmission brake contracting on a bronze drum. The rear wheel brakes are applied through equalizers of the Peerless design, consisting of a cross tree greater in length than the total width of the frame and operating through slots in each side piece of the frame. A survey of the frame reveals such constructions as dropping it in front of the rear axle, bracing the rear cross member by long triangular pieces across the corners and narrowing it in front to increase the turn radius. A subframe is



AEROCAR HOT AIR PIPE, COLUMBUS MOTOR BUGGY POWER PLANT AND PULLMAN FOOTBOARD LUBRICATOR



ONE OF THE MOTOR BUGGIES—THE STAVER

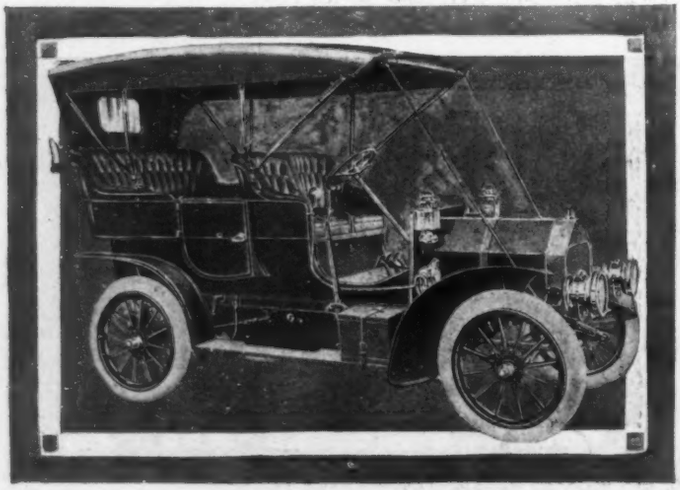


THOMAS B. JEFFERY & CO.'S BIG DISPLAY

not used. Front springs are semi-elliptic 40 inches long and 2¼ inches wide, whereas the rear system is a platform suspension with a cross spring in rear of the back member of the frame and attached to the center thereof by an extension bracket. The forward axle is an I-beam forging and the shaft-drive rear axle has its parts made from chrome nickel steel carried on ball bearings. The wheelbase is 120 inches, wheels are 36 inches in diameter and control parts are conventional.

Federal Shows a Change in Motors

Close students of motor buggies will recall the exhibition a year ago across from the Coliseum, on Wabash avenue, of the Federal runabout, a two-cylinder two-cycle air-cooled friction transmission shaft-driven buggy with 36-inch wheels carrying solid rubber tires. This year, while the Federal name is maintained, associated with it as manufacturer is the Rockford Automobile and Engine Co. The general design of the car has not been changed except that the two-cylinder air-cooled motor has been discontinued and in its place is a 12-horsepower four-cycle air-cooled opposed motor. The general layout of this motor buggy differs from that of any other at the show in that the motor is placed longitudinally in the center of the body at the left side. Instead of a flywheel, there is a large diameter friction disk. Crossing the face of this disk longitudinally is a driveshaft, which is continued to the rear axle. Sliding on this driveshaft is a friction wheel adapted to contact with the face of the flywheel disk for giving varieties of speed. The friction disk is a rolled aluminum one with an 18-inch useful diameter, and the 14-inch friction wheel carries a pressed paper tire, or tar board, as it is generally termed. The friction wheel is rocked against the disk face by means of two swinging brackets which carry the shaft, one in front and the other in rear of the friction wheel.

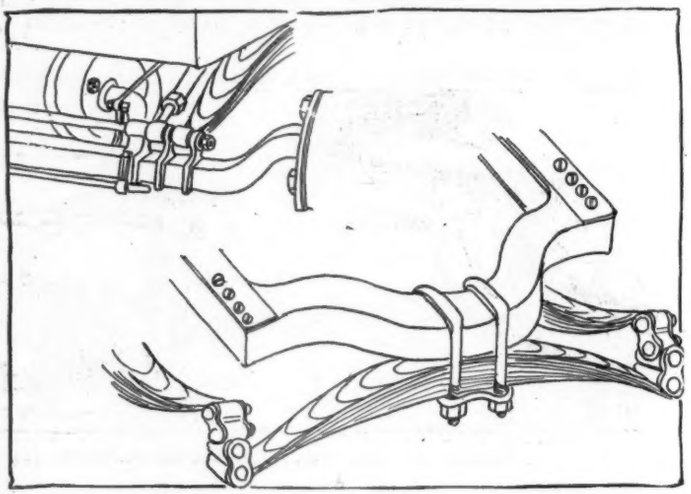


AUBURN IN TOURING CAR FORM

These brackets have long horizontal arms. Bearing upon these arms at their ends are cams which give the required movement to insure friction contact. The side rock of the shaft is taken out between it and the rear axle by a universal joint. The 12-horsepower motor now fitted has 4⅜ by 4-inch cylinders and is carried underneath a special framework across the center of the car. The motor is cooled by the usual method of integral circular flanges and has mechanical intakes and exhausts located in the cylinder heads, which are operated by rocker arms. Lubrication is by an exceptionally large horizontal cylindrical pressure tank, carried transversely over the motor. Ignition and carburation features are not out of the ordinary. The running gear is a 76-inch wheelbase, 12 inches longer than heretofore, scroll-ending elliptic springs in place of semi-elliptics, and an angle iron frame construction.

Auburn Shows Change in Body Design

With the exception of a redesigned body, the Auburn touring car for 1908 is largely the same as that of the present season, having a 24-horsepower rating and a motor with 5¼ by 5-inch cylinders placed longitudinally under the body. The car is designed along that simple two-cylinder construction in which the planetary transmission is carried on a continuation of the crankshaft, with the sprocket for chain drive being placed between the motor and transmission. The car has been considerably improved by the use of a mud apron, which entirely encloses the motor



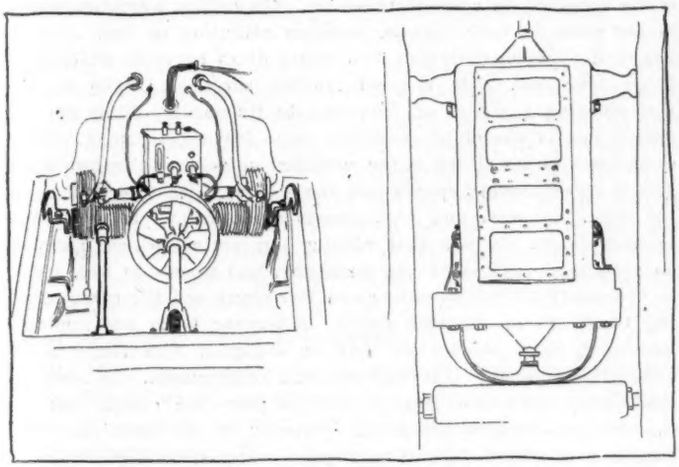
SPRINGS ON THE SCHACHT AND RAINIER

parts and makes it practically an impossibility for water or mud to reach any of them. Ignition is by battery system and in the transmission direct drive is through a fiber disk clutch. External brakes are used on the rear wheels. The pressed steel frame is made of stock ⅛-inch thicker than formerly, but the semi-elliptic springs remain as heretofore. In the control the means of obtaining reverse speed is taken from the side and reposed in the pedal, so that the side lever only gives forward speeds. There are three pedals—one for reverse, one for slow speed and one for the brake. The wheelbase measures 100 inches, the wheels 32 inches in diameter, carrying 3½-inch tires. The axles are as during the present season. In the roadster, which is the new member of the family, the chassis constructions are the same as in the other car, including Hyatt bearings in the rear axle and the Miller nut and screw steering gear. The body is carried 4 inches lower than in the touring car and as usual in roadsters the steering column is given much greater rake. As this concern manufactures its own fenders, bonnets and all sheet metal work these details in connection with the car show particular care in workmanship and finish. The roadster has the usual single seat in the rear and the forward fenders are a little out of the ordinary in that the portion over the wheels is horizontal and bends at a short angle to 45 degrees, where it slopes to the running board. Last year the company manufactured 209 cars, and it expects its output for the approaching season to be 700, the first run of these consisting of 500 and the others 200 extras. The performance of

this car at the recent 600-mile reliability run of the Chicago Motor Club proved one of the surprises of the test in that the car had a clean road performance from start to finish and on its final examination showed up in good form. The principle change in the touring car body is that a straight line design is used, which gives much more room in the tonneau. The radiator has been increased in size and made conical in shape, together with a number of minor improvements which have increased the efficiency of the car.

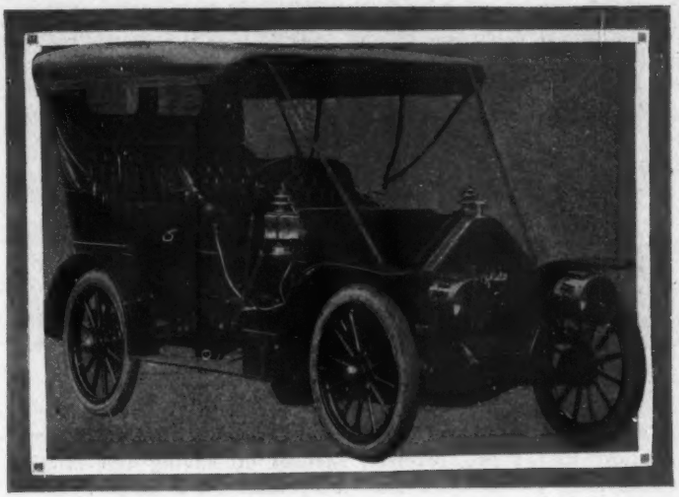
Diamond T Adds a Roadster to Its Line

The Diamond T Motor Co., a Chicago concern, which made its debut a year ago, has made not a few alterations in its car during the fall and has added a two-passenger roadster which is one of the attractive creations of the show. Touring car and limousine styles are shown in addition to the roadster. The motors employed this year in all of them are 50-horsepower Continentals, with 5 by 5-inch cylinders, these having twin castings, with valves on the right side. Ignition is by a Bosch magneto, located centrally on the left, which side also carries the water pump. The clutch has been improved by being made larger and using flat springs beneath its surface instead of employing cork inserts. In the three-speed selective transmission the shafts have been made heavier than they were and the gears also have been increased. The new oiling system employed eliminates the separate multifeed oiler and replaces it by a gear oil pump which



DUER AND PULLMAN THREE-POINT SUSPENSION

takes oil from a sumpt or crankcase basement and forces it through ducts formed between the halves of the crankcase to the crankshaft bearings, the overflow from these augmenting the splash in the base, after which it is refiltered to the oil reservoir or basement. The steering wheel has undergone an increase of 2 inches, its 1908 diameter measuring 18 inches. Referring particularly to the roadster, it should not be overlooked that it has horizontal shaft drive, in that when two passengers are aboard the crankshaft, transmission shafts and propeller shaft are in the same horizontal plane. This has been accomplished by the general lower suspension of the power plant and also the arching of the frame over the rear axle. The forward axle is of slightly different design than formerly and the radiator is carried 4 inches in the rear of it, whereas in the touring car and limousine the radiator is in the same vertical plane. The roadster's wheelbase measures 114 inches, whereas that of the touring car and limousine is 10 inches greater. Although 36-inch wheels are regularly fitted the touring car and limousine use 4½-inch tires all around. The roadster has 3½ and 4-inch sizes fitted in front and rear. An improvement in the steering knuckle is the placing of Timken rollers in the upper end so the car load is carried on these. Springs have been made as flat as possible, being the semi-elliptic type. On the roadster a couple of short top leaves to restrict the rebound are positioned. The I-beam forward axle in this car is 1⅝ inches, but in the touring car it is 1¾ inches. Most noticeable and interesting is the use of internal and external rear wheel brakes, which are interconnected by equalizers,

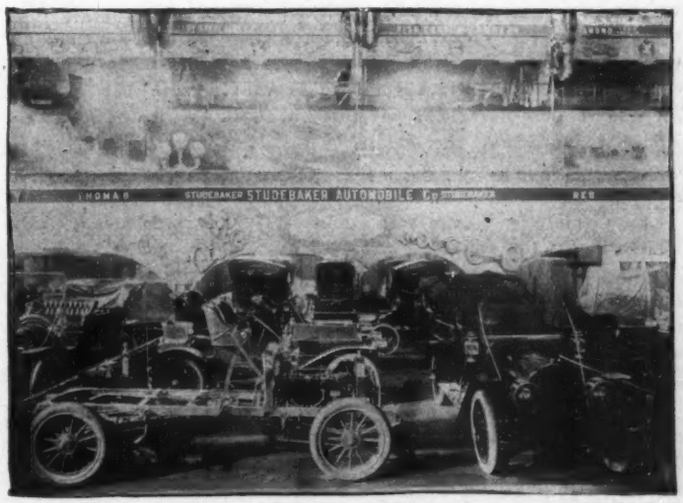


JEWEL IN ITS NEW FORM

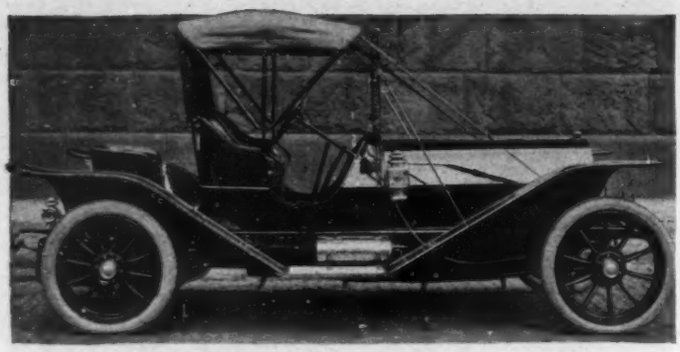
so that whether the brake pedal or brake lever are active both sets are brought into operation at once. It is impossible to apply the emergencies without applying the regular brakes. This is accomplished by placing a cross equalizer, to which the center of the brake cable attaches. The ends of this equalizer attach to short vertical equalizers outside of the car frame at the rear, which have connection with the internal and external brakes. Further, the connections between the brake lever and brake pedal are such that when the brakes are applied by pedal the lever remains stationary; when applied by lever the pedal is moved. The front fenders of the roadster are hinged to the running board and the brackets supporting them in front are secured by a set screw, making it possible to loosen the set screw and swing the fender back to rest on the rear fender, leaving free access to the motor side. The touring car and limousine bodies are of wood construction, but the roadster has an aluminum body.

Schacht Employs a Friction Transmission System

Of primary difference from many others in the motor buggy class is the Schacht because it employs a friction transmission system in conjunction with side chain-drive to the rear wheels. The Schacht motor is carried under the seat and accessible from the rear of the car so that by raising the lid of the body behind the seat access is gained to every part of the 12-horsepower two-cylinder motor mounted transversely therein. On the forward end of the crankshaft is a flywheel and in conjunction with the front face of the flywheel is a friction disk of compo metal equal in diameter to the flywheel and so attached that this disk is forced forward against the surface of a friction wheel on a jackshaft. On the ends of the jackshaft are sprockets for side chain-drive. Provision is made to slip the friction



WHERE THE STUDEBAKERS ARE SHOWN



TINCHER ROADSTER, WITH A NEAT-LOOKING TOP

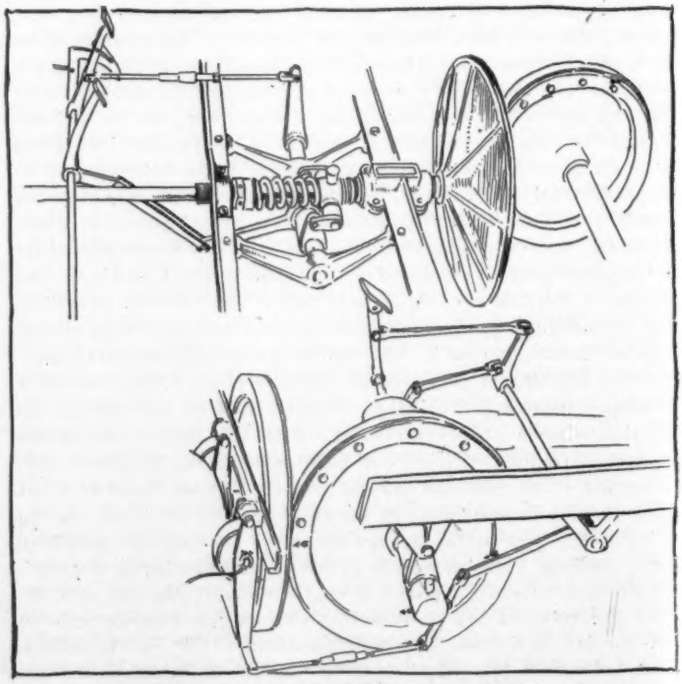
wheel on the shaft across the face of the disk to give different forward speeds and reverse. Instead of having the friction wheel slide on the jackshaft it operates on a large drum in which is the differential. In general layout the Schacht is a paradox in that the motor is to the rear and the transmission in front of it, the jackshaft, the forward element of the car, being located under the seat. The friction is moved over the drum on the jackshaft by a side lever and the friction disk is moved up to it by pedal and withdrawn by a series of springs. In the Schacht running gear, which is a carefully-worked-out portion of the car not to be overlooked, is the drop forged axles of square cross section 1½ inches to the side and the dropping of these slightly between the wheels and the vertical plane of the spring. Instead of shackling the springs direct to the axle they are attached to rod above and paralleling the axle and supported on the axle through a couple of brackets. The spring shackles hang from the end of this rod toward the axle, and the springs are of the side style as introduced on the Oldsmobile runabout years ago, and also used on Knox single and double-cylinder cars. Stiffening the running gear is a pair of reach rods connecting the axles in the plane of the side spring. In many regards the Schacht is a miniature large car with its Timken rollers for carrying front and rear wheels, its pretentious worm and sector steering gear and large-diameter steering wheel with spark and throttle control on semi-circle above it. Two internal brakes are placed to act on drums on the rear wheels. The car has a 65-inch wheelbase and a 36 and 40-inch wheels front and rear, respectively.

Aurora Shows Several Changes for Next Year

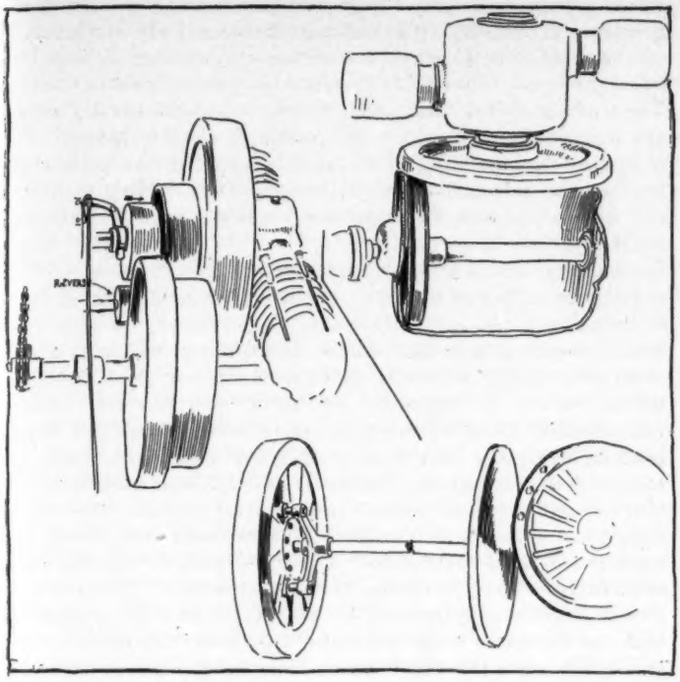
The Aurora motor buggy which was seen at the Chicago show the first time a year ago has undergone few changes since then. Among these, however, should be noted, changing the wheel diameter to 32 inches, thereby giving a high road clearance and making the use of solid rubber tires a better riding proposition. The valve timing has been changed, the maker asserting he has gained a good increase of horsepower thereby and the piston weight has been considerably reduced. The lubricating system is now operated by crankcase compression with check valves of the company's design. The deck of the body has been changed so as to make the lines compare favorably with the general torpedo shape. For those not familiar with the Aurora, it will suffice to say that the motor is a 20-horsepower plant with opposed cylinders mounted transversely over the front axle and having the flywheel in front, the two-speed planetary transmission immediately in the rear and shaft-drive to the rear axle. In the motor the cylinders have a bore and stroke of 4½ and 5 inches, the intake and exhaust valves are mechanically operated, the cylinders and pistons are cast from a special iron composition, the crankshaft and connecting rods are steel drop forgings, the bearings are scraped throughout, the water cooling is by a thermo circulation, having the usual course from the bottom of the radiator to the jackets and from the top of the jackets to a point two-thirds the height of the radiator. A Schebler carbureter has been fitted and for the ignition plant are two sets of dry cells in conjunction with a two-unit Splitdorf coil. The oiler is an integral portion of the motor in the form of a cubical tank above the crankcase. Speed variation is through a two-speed planetary having direct drive on the high and low speed and reverse through fiber-lined brake bands. Incorporated in the motor buggy's running gear are angle steel frames reinforced by brace and trusses, tubular front axle with standard roller bearings for the wheels, semi-elliptic springs in front and a platform in the rear and 80-inch wheelbase. The wheels are 32 inches in diameter and carry either 3-inch solid tires or 3-inch clincher pneumatics. Complete the car weighs 1,500 pounds, carries a 12-gallon gasoline tank and has an equipment of side oil lamps, rear oil lamps, horn and the usual repair kit.

Lauth-Juergens Car Is Made in Two Styles

The Lauth-Juergens tourist, a four-cylinder car, is manufactured in two styles, one with a 50-horsepower motor with separately-cast cylinders of the T-head style, having intakes on the right, exhausts on the left and cylinders with a 5-inch bore and 5½-inch stroke. The other motor has cylinders of the straight type, with intake and exhaust valves in the cylinder heads operated from a single camshaft on the left through the medium of overhead rocker arms. This motor, with cylinders having a 5-inch bore and 6-inch stroke, is rated at 50 horsepower. Apart from the different cylinder design the motors are conventional and carry such well-known earmarks as enclosed half-time gears at the forward end, integral waterjackets, two-part crankcase, positive water circulation, and splash lubrication, with sight oilers operated by exhaust pressure. The clutch, however, which is the same in both models, deserves attention in that it is of the disk type consisting of two metal disks between which is a large fiber disk with a good friction surface. Owing to the slow-wearing qualities of fiber and to its nature, oil is not required nor is the clutch enclosed in a dust-tight casing. Next of interest to the clutch is the combination selective transmission giving three forward speeds and one reverse, with direct drive on the high. Medium and high speeds are obtained by what the company calls its patented sliding jaw clutch which operates on a squared portion of the mainshaft and serves to lock gears to this shaft. The end notches on this shaft and the corresponding teeth are of variable depth. Alternate teeth are approximately ¼ inch shorter so that in engaging this there is no difficulty in getting this half an inch engagement. As soon as the clutch teeth are meshed in this way the clutch can be shoved home without difficulty. Were all of the teeth the same height it would be difficult to engage. Any speed can be taken up without passing through others; one lever operates all speeds



EARLE AND LAMBERT FRICTION TRANSMISSIONS



REEVES, BLOMSTROM AND CARTERCAR FRICTION SETS

and all speeds can be thrown out and locked. The gear shift lever locks when the gears are in neutral and cannot be shifted until the clutch is released. The Lauth-Juergens cars are provided with standard running gears consisting of pressed steel framework with subframe for carrying the motor and transmission; I-beam front axles; floating rear axles; semi-elliptic springs in front and rear and internal and external brakes acting upon rear wheel drums. Wheels are 36 inches in diameter, the wheelbase is 118 inches and the gasoline and water capacity 20 and 5 gallons, respectively.

Stratton's Body Design Is a Novelty

The Stratton Carriage Co. exhibits the greatest novelty in body designs, its folding tonneau being mounted as on a Cadillac car. When made without a top the vehicle is for either two or four passengers. When a two-passenger vehicle the tonneau folds compactly in rear of the seat. As a covered vehicle a greater folding scheme has been affected. The back of the seat folds upwards, forming the top for the rear seat, so that when the rear seat is lifted the enlarged body is a four-passenger one, with symmetrical cover over both seats. A touch of novelty is added in that the car can be converted into a sleeping apartment by swinging backwards the back of the front seat, so it bridges the gap between the front and rear seats. After this is done the footboard can be placed between the edge of the front seat and the dash, so there is a couch extending from the back of the rear seat to the dash. Not more than 1 minute is required to fold away these many parts and reduce the car to a two-passenger coupe.

Interesting Vehicle Is the Black Motor Buggy

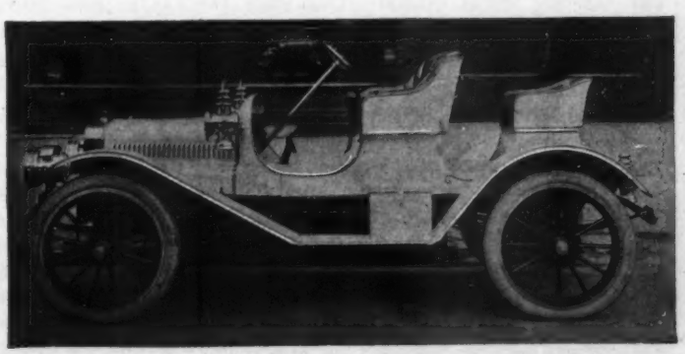
One of the 1907 crop of motor buggy builders is the Black Mfg. Co., a Chicago concern, which has on hand a most interesting little vehicle, lightly constructed, yet provided with good power for road work. In general design it follows that all-American style of placing the two air-cooled cylinders lengthwise under the body amidship, so the bore of the cylinders parallels the frame. On the crankshaft continuation is a two-speed and reverse planetary gearset, while between the gearset and the motor is a sprocket for single chain drive to the jackshaft. The motor differs from many employed in that its cylinders are separate castings bolted to the opposite sides of the cubical-shaped crankcase and in that each cylinder has integral radiating pins throughout the useful length of the cylinder wall and horizontal flanges for the cylinder head. Each cylinder has on the end of the barrel portion an expansion in which is carried the mechanical exhaust valve and the automatic intake, the exhaust being opened through push rods lying along the top of the cylinder, this rod being operated from a camshaft enclosed in the upper portion of the crankcase. The car, however, follows the usual custom of design by supporting the motor beneath the frame members; this support being from a couple of angle crosspieces. Motor lubrication is through a four-feed compression oiler, the pressure for which is taken from the exhaust. To assist in cooling the cylinder heads as well as the valve chambers a small four-bladed fan is mounted at the left side of the cylinder head, so that the draught created by it strikes the side of the head and the side of the valve chamber. There is one of these fans for each cylinder and the drive is by a round leather belt passing over the motor flywheel, the flywheel having a central groove in its surface for taking the belt. The construction has been followed by one other maker of motor buggies. Drive from the motor shaft is through a single chain to a jackshaft carried in front of the rear wheels, and on the ends of this shaft are sprockets for chain drive to the wheels. The jackshaft is supported through a pair of metal cross supports. Instead of using side springs the company has gone a step further than many by the introduction of two full-elliptic springs placed transversely, one over the forward axle, the other over the rear axle. The running gear is of the reach type in that the forward and rear axles are joined by longitudinal supports, one at each side of the body. Steering knuckles on the forward axle are of the usual design. On the rear wheels are drums for taking the band brakes.

Not Many Changes in the Aerocar Models

Aerocars in air and water-cooled makes are on hand, both styles of cars being practically as when seen at the shows a year ago. Two models of the air-cooled car are shown, the touring car and roadster, but only the touring car of the water-cooled type is exhibited. The air-cooled car continues to use its 20-horsepower four-cylinder four-cycle engine, which drives through a multiple disk clutch, three-speed sliding transmission and floating rear axle. The car has 104-inch wheelbase, 32 by 3½-inch tires and the usual equipment, including a four-feed belt-driven lubricator, Schebler carbureter and battery ignition. The water-cooled car carries a four-cylinder Rutenber engine rated at 40 horse, with 5 by 5-inch cylinders. As usual with this make of engine the cylinders are separate castings, with valves on one side. The timer for the battery ignition is placed on top of a vertical shaft on the rear of the motor. Driven off its center by bevel gear and belt is the oiler located on the dash. On this car as well as on the air-cooled style a valve for the regulation of hot air to the carbureter is used. The carbureter induction pipe carries a transverse cylindrical opening, in which is placed a cylinder valve, held in position by a spring. This valve has a hand adjustment whereby the air opening can be varied. The water-cooled car has a differently designed body from the air-cooled, it possessing a hollow dash, low side doors at the ends of the front footboard and straight line body.

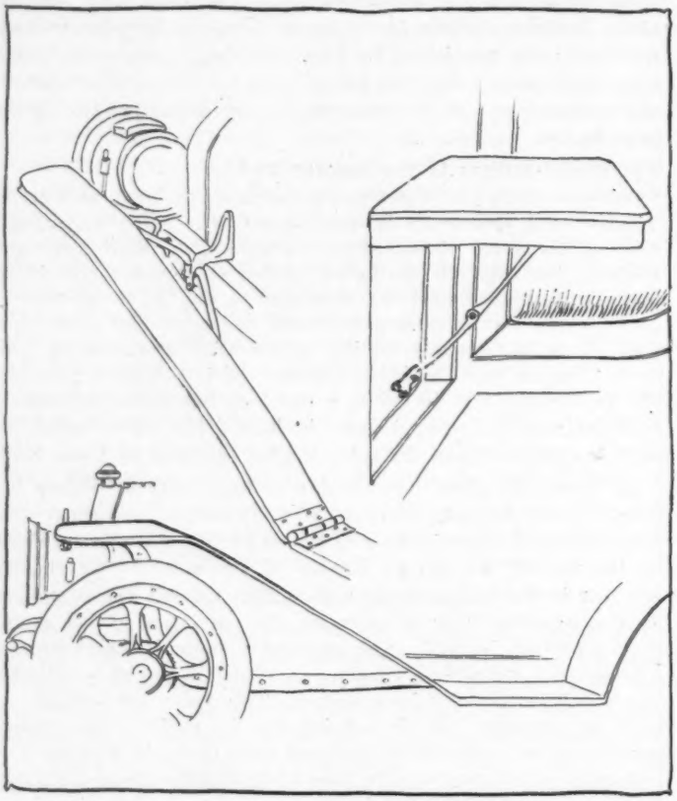
Lambert Shown in Four Different Models

Lambert friction-driven cars are shown in four models as follows: R, 35-40-horsepower touring car for seven passengers, with side chain-drive and 106-inch wheelbase; M, 35-40-horse-



CARTERCAR WITH A ROADSTER BODY

power shaft-driven car for five passengers and with 105-inch wheelbase; S, 24-horsepower two-cylinder five-passenger car, with side chain-drive and 94-inch wheelbase; and the new 18-horsepower two-cylinder runabout for three passengers and which has single chain-drive and 95-inch wheelbase. It is in this little runabout that the new Lambert friction transmission is used. The motor is carried transversely in front and immediately in rear of it is a flywheel. On the rear face of the flywheel are three driving pins arranged as the apexes of an equilateral triangle, with the crankshaft the center of the triangle. On the forward end of the extensionshaft which carries the friction disk on its rear end is a three-armed spider with holes for receiving the flywheel pins and adapted to slide on the pins when the friction disk is moved backward or forward against or away from the friction wheel on the crossshaft. The crossshaft is rigidly supported on the frame and in this respect differs from the Lambert friction transmission as used on its three larger cars as in them the jackshaft is swung forward towards the friction disk, the disk remaining rigid. In the runabout transmission an 8-inch ball thrust is interposed between the rear of the disk and the sliding collar which carries the diskshaft backward. Drive is by single chain from a sprocket on the right end of the jackshaft. Feat-



DIAMOND T FENDER, AUBURN FENDER AND PIERCE-RACINE SEAT

ures of the runabout motor are 18-horsepower water-cooled opposed cylinders with 5-inch bore and 4-inch stroke; mechanical valves; thermo-syphon water circulation; forced feed lubrication and steering wheel control. This little car has a band brake on the rear wheels, 30-inch wheels, four semi-elliptic springs, 95-inch wheelbase and the customary Lambert armored wood frame. In the two four-cylinder Lamberts the 35-40-horsepower Rutenber motor is used and in the friction transmission employed the 20-inch aluminum-faced disk is carried on the crankshaft immediately in the rear of the crankcase. It does not slide but is protected by a large ball thrust bearing between it and the crankcase. The crossshaft in the rear of the disk face carries a 20-inch friction wheel and the housings carrying the end bearings of this shaft are pivoted at the frame so the shaft rocks forward against the friction disk for driving contact. On the forward side of the friction disk are two pulley idlers, one at each side and bearing against the disk at its periphery, so when the jackshaft wheel is rocked against the disk at the rear these idler thrust pulleys rock against it at the front, thereby preventing the springing of the disk. On the shaft-driven car the driveshaft is to the right and takes its drive from the rocking jackshaft to bevel gears and delivers it to the rear axle through similar bevels. The shaft is housed throughout its length and the bevel gears on the rear axle and those on the jackshaft are also housed. The driveshaft has a sliding fit in the hollow end of the pinionshaft on the rear axle and the shaft housing has a sliding fit at the forward end so that all variations are taken up when the jackshaft is rocked.

Reeves a Car of the Motor Buggy Type

The Reeves Pulley Co., of Indianapolis, after manufacturing a 10-horsepower opposed two-cylinder air-cooled engine with 4 by 4-inch cylinders, early last summer decided upon the manufacture of a motor buggy with this motor as the power plant and since has perfected an ingenious two-speed and reverse friction transmission, which operates the same as a sliding gear transmission, excepting that instead of gears with teeth there are blank friction wheels and instead of sliding these friction wheels into contact they are classed into driving contact. The motor buggy has a double transmission, one for each rear wheel, and from the divided countershaft forming a part of this transmission, drive is by side chains to the rear wheels. The motor is placed longitudinally midway between the frame side pieces and with the crankcase under the seat. The crankshaft extends right and left beyond the crankcase and carries thereon at each side two friction pulleys made of tar board. The pulley next to the flywheel is keyed on a tapered shaft and is hollow so that the smaller pulley outside of it can slide within it for reasons mentioned later. Beneath the right extension of the crankshaft is a countershaft on which are aluminum friction pulleys for contacting with the two on the crankshaft. On the end of the countershaft is a sprocket for chain-drive. To secure engagement between the friction pulleys on the crankshaft and those on the countershaft the countershaft housing has a forward arm pivoted to the side of the frame. With this as the center the shaft is swung upward and slightly to the rear for engagement. This has a perceptible slackening effect on the drive-chain, but nothing of consequence. To get the reverse drive a friction idler is interposed between one of the countershaft pulleys and one of the crankshaft. On the left side of the motor is a similar transmission for driving the left road wheel, so the car has two transmissions, one at the right side for the right road wheel and one at the left side for the left road wheel. The car is without a differential. Before leaving the transmission the brake should be noted. It is a semi-circular metal one, conforming in contour with the periphery of the large friction pulley on the countershaft. In applying the brake the countershaft is thrust downward against this shoe. In the running gear are semi-elliptic side springs connecting the front and rear axles; rack and pinion steering gear with hand wheel control; angle iron frame and Timken axles. The little car has a 72-inch wheelbase and 40 and 44-inch wheels in front and rear.

Blomstrom Has One of the Novelties

Although not exhibiting at the show but holding forth at its salesroom on Michigan avenue, the Blomstrom Mfg. Co. exhibits one of the novelties of the week in the form of a two-cylinder 20-horsepower engine with opposed cylinders mounted longitudinally under the hood and with the crankshaft vertical instead of horizontal. On the lower end of the crankshaft is a horizontal flywheel, attached to the under face of which is an aluminum friction disk 22 inches in diameter. The driveshaft from the rear axle is continued forward beneath the motor, the portion beneath the motor being carried on two special bearings and carrying between these bearings a 17-inch friction wheel which slides thereon and engages with the flywheel disk, forming a friction transmission, giving any number of speed variations. This friction wheel is moved along its feathered shaft by a lever and when it contacts with the rear half of the flywheeled disk the drive is forward; when moved past the center the reverse is in action. To give driving contact between the wheel and the disk, the aluminum housing which carries the two bearings for the forward

portion of the driveshaft is raised by a pair of eccentrics placed at the front and rear so the shaft always parallels the face of the disk. Large ball thrust bearings are placed between the flywheel and the crankcase to take up the thrust when the friction wheel is pressing upward on the disk. On the top of the crankcase is another ball thrust which carries the crankshaft and flywheel when it is running idle. There is but one universal joint in the driveshaft which is located just in rear of the forward part of the shaft on which the sliding friction wheels work. The maker claims that with a horizontal flywheel the gyroscopic action is obtained and further asserts that when running the motor is practically free from vibration. A novel method is resorted to by cranking the motor which takes the form of a bevel gear on the top end of the crankshaft which meshes with another bevel on the horizontal shaft extending rearward through the dash. On the end of this horizontal shaft is the starting crank, allowing of the motor being started without the driver leaving his seat. The motor is rigidly supported on a pair of transverse channel frame members by pedestal brackets. A few features of the motor are 5 by 5-inch cylinders, thermo-syphon cooling, Lavigne lubrication and Schebler carburation. The car has a 100-inch wheelbase, 32-inch wheels with 3½-inch tires, semi-elliptic springs, expanding brakes on the rear wheel hubs and a straight tubular front axle. The unique motor position and transmission system is the design of J. T. Lavigne, the Detroit lubricator man. The company claims to have given the car already over 8,000 miles. In addition to this the company is showing its four-cylinder car, placed on the market a year ago, full details of which have been published in Motor Age.

Holsman in Runabout and Surrey Styles

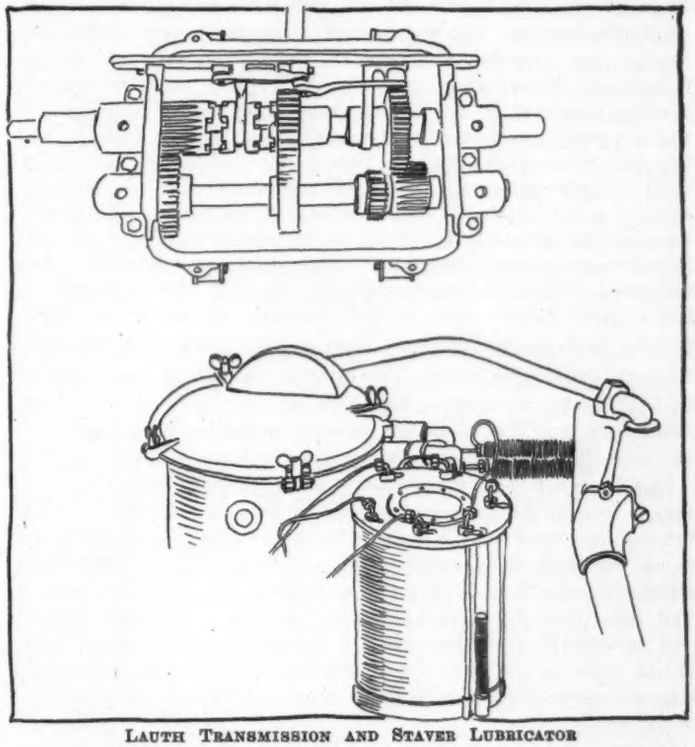
The Holsman motor buggies—the great-grandfathers of the motor buggy—are shown as usual in runabout and surrey styles with the addition of an enclosed runabout which corresponds in the motor buggy class with a limousine in the touring car field. In all Holsman cars, the motor is a 12-horsepower two-cylinder opposed air-cooled power plant, with 4 by 4-inch cylinders. It is placed longitudinally midway between the frame side pieces and under the seat of the car. The motor has its two cylinders and crankcase an integral casting, with the cylinder heads detachable and threaded into position. The bore of the one-cylinder is in alignment with that of the other, thereby necessitating a slight offset in the connecting rods. On the left side of the motor is the flywheel. The crankshaft is continued to the right and carries a pair of sprockets loosely mounted thereon and made to be locked to the shaft by a double dog clutch operating between them. A countershaft extending transversely of the car carries a pair of corresponding sprockets which connect by chain with those on the motorshaft and give the two forward speeds. Near the ends of the countershaft are pulleys for rope-drive to the rear wheels. Low or high speed ahead is obtained by moving the dog clutch and locking either of the crankshaft sprockets. To get reverse speed a pair of pulleys are carried on the ends of the countershaft and outside of those pulleys used for the cable-drive to the rear wheels. To reverse, the countershaft is swung back so these pulleys engage direct with the flanges on the rear wheel rim and not with the rubber tires on the rear wheels as generally supposed. When changing into either of the forward speeds the countershaft is swung back, slackening the cables, the result being the same as when a clutch is pulled out in a four-cylinder motor. This done, either the first or second speed sprockets are clutched to the crankshaft after which the cables are tightened.

Perfection Comes from South Bend

The Perfection car, manufactured by the Perfection Automobile Co., South Bend, Ind., is a four-cylinder 35-horsepower design fitted with the Continental style of engine, planetary transmission, shaft drive, and conventional rear axle. It is manufactured in five-passenger touring car style and three-passenger roadster, the power plant in each being practically alike. The motor, like all of its class, has cylinders cast in pairs, with valves on one side, and integral waterjackets. Its bore and stroke measure 4⅝ and 4¾ inches, respectively. Cylinders are bored, reamed and ground; piston rings are ground to the cylinders and other moving parts of the motor show similar accuracy of construction. All roller bearings are of Parsons white bronze. Carburation is through an automatic Schebler.

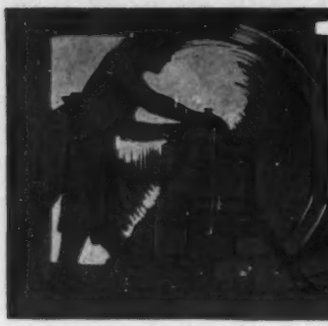
Earl Friction-Driven Roadster

Another one of the outside exhibitions of the Michigan avenue motor car row is the Earl, a 16-horsepower two-cylinder roadster which is a Kenosha, Wis., product and a friction-drive machine. The general layout of the car is briefly as follows: The opposed water-cooled motor is mounted transversely in front under the hood and has 5½ by 4½-inch combustion chambers. On the rear face of the flywheel, which is located immediately in the rear of the crankcase, is a flange with short sleeve. A longitudinal driveshaft is a sliding key fit within this sleeve and carries on its rear end midway of the axles a large friction disk. In the rear of this disk is a rigidly-supported jackshaft carrying a sliding friction wheel which moves across the face of the disk to give forward and reverse speeds. On the ends of the jackshaft are sprockets for side chain-drive. In securing driving contact between the friction disk and the friction wheel on the crossshaft the disk is forced backward by a stiff spring much the same as when a cone clutch is thrust by a spring into the flywheel. The entire shaft carrying the disk slides in the sleeve attached to the rear of the flywheel. This friction transmission is peculiar in that normally the disk is held against the wheel with driving contact. When the ratchet pedal is used the disk is drawn forward



LAUTH TRANSMISSION AND STAVER LUBRICATOR

and away from the friction wheel and, incidentally, against the tension of the spring. The only thrust bearing required is between the shifting collar and the disk. On the Earl jackshaft is a differential gear of the spur type so that in rounding corners the designer does not depend on slip between the friction wheel and disk. The Earl system resembles the Lambert and Cartercar in that only a single friction wheel and one friction disk are employed; but of course the method of contacting the two is different in all three. Combined in the Earl running gear are an armored wood frame with wood sills 3½ inches deep and 1½ inches thick; external Raymond brakes on the rear hubs; full-elliptic springs; tubular front axle with ball bearings for the wheels; rear wheels carried on ball bearings; 100-inch wheelbase and 30 by 3-inch tires. A Beaver motor is employed and connected with it are a Schebler carbureter, jump spark ignition and five-lead Schoelkopf oiler, two of the leads of which pass to the crankshaft bearings, two to the cylinders and one to the bearings carrying the friction diskshaft.



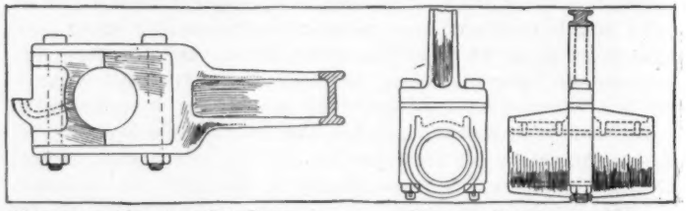
Bearings and Their Materials

Editor's Note—This article was written for the A. L. A. M. show number, but was delayed in transit. As nearly all the cars mentioned are exhibited at Chicago, it is believed its publication now is most timely

SO FAR as tendencies are observable in the selection and design of bearings, three in particular may be noted—the steady trend toward ball-bearing crankshafts; the disposition of certain builders, after careful study and adaptation, to proclaim themselves absolutely satisfied with roller bearings properly chosen for the work they have to do; and the growing popularity of soft metals, such as babbitt and Parsons white brass, for plain bearings in the engine. As regards ball-bearing crankshafts, practice has not yet determined the respective merits of the solid crankshaft with bearings slipped over the cranks from the front end, and the divided or built-up type in its various forms. The Lozier, Pope-Toledo, Selden and Thomas cab motors use solid crankshafts: the six-cylinder Oldsmobile uses a built-up shaft. An accompanying sketch shows the principle of the Oldsmobile construction. AA are the cranks, and the shaft is divided crosswise in the center of the bearing at B. Each of the cut ends is counter-bored as indicated by the dotted lines CC, and a steel disk closely fitting the two recesses serves to center them accurately. One of the shaft ends is tongued and the other is grooved to correspond. This tongue and groove transmit the torque. The shaft is assembled with a sleeve E, shouldering between the crank fillets and carrying the inner ball race, which is clamped tight by the nut F. The shaft of this engine likewise runs in ball bearings, of which the front bearing is clamped in place by the end cover plate, and holds the shaft in position endwise. The other ball bearings are slip fits in their seats. When the camshaft is withdrawn the bearings come with it. The cams are securely keyed on the shaft and are held from slipping endwise by means of thin tubular spacers.

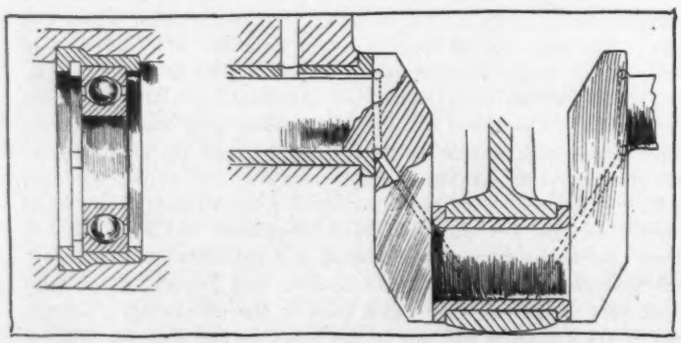
The Lozier is one of the latest cars to make very complete use of annular ball bearings, the F. & S. being selected. Ball bearings are used on the crankshaft, the shafts which drive the fan bevel gears, the camshafts, the pump and magneto shaft, the distributor shaft, and even the crossshaft carrying the pedals. The ball bearings in the gear box are held by bronze straps and separate studs, so they are not loosened when the upper half of the case is removed. In all, twenty-four sets of ball bearings are used in the four-cylinder motor alone and about thirty in the six-cylinder.

In striking contrast to Lozier practice is the Haynes, in which car there is not a single ball bearing. On the other hand, roller bearings are used wherever possible and in considerable variety. Hyatt bearings are used in the rear axle, a Timken roller bearing and a parallel roller bearing on the bevel pinionshaft, the former acting to take the thrust of the bevel pinion; American roller bearings are used in the gear box, Timkens in the front wheels, and, as a special novelty, roller bearings of the Haynes company's own manufacture on the front and rear ends of the crankshaft. The construction of these special bearings is somewhat like that of the American roller bearings as regards the length of rollers, which are 1¼ inches long in both bearings, and in the arrangement of the cages. The cages are built up of flat rings connected by substantial spacing rods having their ends rivetted tight; and the ends of the rollers themselves have small projections or pins which enter holes in the rings. The especial novelty of the bearings, however, is that they are slightly adjustable for wear by compressing the outer sleeve. This sleeve, which is shown in the sketch at A, is slitted at B, this form of slit being chosen because it does not create a tendency on the part of the sleeve to creep spirally as a straight diagonal slit would. This sleeve is parallel inside and outside, and is surrounded by a bushing C, which is slightly tapered on its outer surface and is grooved at several points DD and slitted clear through lengthwise at E. This sleeve enters a seat made conical to match it, and is forced home by threaded ring or follower F. The conical sleeve is in this manner compressed on the bearing sleeve, and this makes it possible to take up the wear between the latter and the rollers. Mr. Haynes, the inventor, stated that as a matter of fact the adjustment required is exceedingly slight. The intermediate bearings are plain and are supported from above by straps as usual, so that by taking up the wear in the lower halves the bearings always can be aligned at once. An interesting feature of the engine is the addition of a light secondary flywheel at the front end, to hold down the front end of the shaft against the lifting action of the front piston at the beginning of the suction stroke, and also to equalize the torsional stresses to which the shaft is subjected. This same flywheel serves also the purpose of a belt pulley for driving the fan. The roller drive in the Haynes rear axle is continued without change, it being claimed that the wear even between the rollers and their pins is so slight as to be hardly measureable.

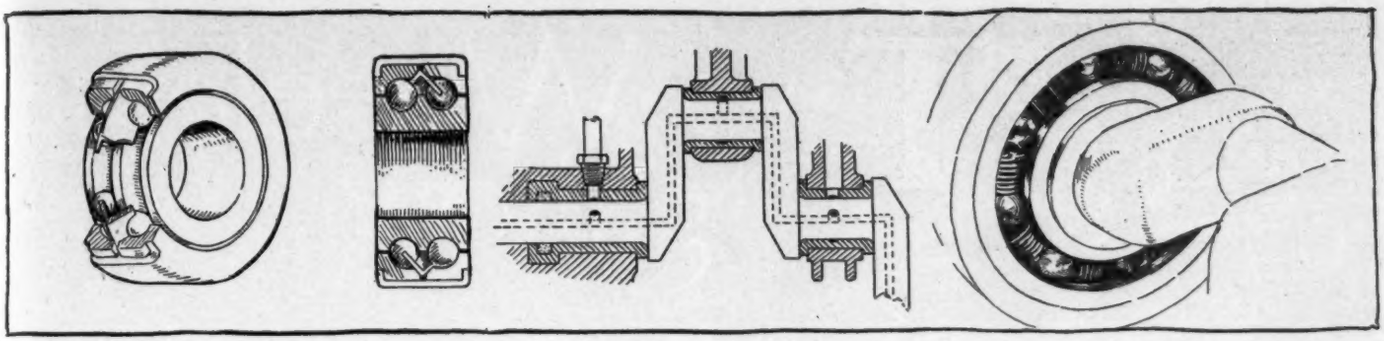


MATHESON ROD AND OIL SCOOP HEWITT CONNECTING ROD

The system of oiling the crankpins used in the Pierce-Arrows for several years, with such remarkable success that the Arrow cars are said to run more than 10,000 miles without requiring the taking up of the main or crankpin bearings, has been adopted in the Buick cars this year, including the new light four-cylinder runabout. In substance, this system is simply the provision of a continuous oil passage from end to end of the crankshaft, with the ends of the holes plugged and outlets drilled into the main oil passages from the middle of each main bearing and each



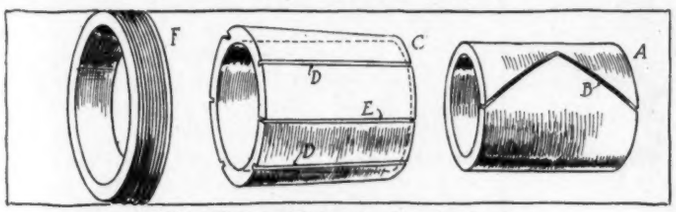
SELDEN BALL RETAINER WINTON OIL FEED



NEW DEPARTURE BEARING AND CONTAINER — PIERCE OILING SCHEME — LOZIER CRANKSHAFT BEARING

crankpin bearing. Each bushing is grooved circularly around the hole in the shaft, and oil pumped from the bottom of the crankcase is sent through a filter to an oil reservoir near the top of the engine, whence it flows by gravity in a constant stream to the grooves in the main bearings. From these grooves it enters the oil passages in the shaft, and is carried out by centrifugal force to the crankpin bearings, which is similarly grooved. As the oil escapes from the ends of these bearings, a continuous circulation is kept up, which is as rapid as the fit of the bearings will permit. The system as above described applies properly to the Pierce Arrow and the larger Buick. In the Buick four-cylinder runabout the oil feeds from a Hill Precision oiler to the main bearings, but the crankpins are oiled as above.

In the Knox, the oil circulating system appears to have gone a step further. Instead of feeding oil by gravity from a tank, it comes directly from the pump under pressure, and a spring relief valve returns any excess to the crankcase. A tube running the length of the connecting rod carries oil to the wrist pin from a hole in the lower bearing, which registers once in each revolution with the outlet in the crankpin. The Knox



HOW HAYNES BEARINGS ARE ADJUSTED

main and crankpin bushings are babbitt, cast in steel molds under hydraulic pressure, and finished internally by drawing a tapered mandrel through them.

In the Thomas Forty the front and rear crankshaft bearings are solid bushings of Parsons white brass. The flywheel is held on the shaft by a taper and keys, and it is evidently necessary to take it off to replace the rear bushing; but the makers consider the saving in expense of reaming a solid bushing, as compared with scraping a split bushing to fit, to justify this construction. In this car the two camshafts run in Hess-Bright ball bearings, but Timkens are used in the gear box and the front and rear axles.

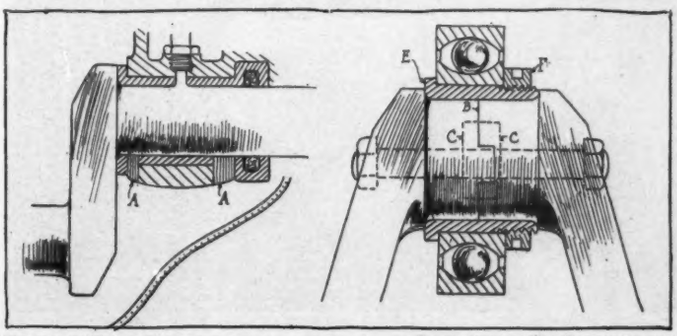
In the Thomas Flyer split bushings of babbitt metal are used on the main bearings, and the two end bearings have recesses cast at their outer ends into which felt washers are fitted to prevent leakage of oil. In order to permit the oil traveling from the oil pipe to the outer end of the bearing to escape there and not become dead, a large hole is drilled in the bottom of the bushing, from which the escaping oil runs down into the crankcase. At the front end of the shaft the two-to-one pinion is located in front of this felt ring, and a regular screw stuffing box is provided where the shaft comes out through the front cover plate. The crankpins are oiled by splash alone, though a small pocket is provided in the bottom shaft to hold and distribute the oil entering through the oil hole in the upper half of the bearing; and baffle plates are provided under the cylinders.

The main and crankpin bushings of the Locomobile are of white brass, and are finished internally by being compressed. They are first clamped together in forms with their internal diameters a little smaller than the shaft size, and a long, slightly tapered and polished steel mandrel, having its surface oiled, is slowly forced through the bushing. This is followed by a slightly larger mandrel, and that by two others, so that the inner surface is finally compressed between toughness and a glasslike and perfectly accurate finish. No hand scraping is required. Hess-Bright ball bearings are used in the gear box and in front and rear wheels.

The Peerless shows no especial change in bearings since last year. Both this and Winton use Parsons white brass bushings on the crankshaft and crankpins. The Peerless crankpins are oiled by scoops attached to the connecting rod caps, and the main bearings by splash. The Winton has an elaborate circulating system, which maintains a certain level of oil in the crankcase, but a plunger pump takes all surplus oil and sends it through a filter and gavity tank at the front end of the engine back to a Hancock mechanical oiler under the footboard. This oiler feeds the cylinders and main bearings. Each main bearing has a groove leading to an under cut recess in the crank, as shown in the sketch, from which recess a hole is drilled to the crankpin. The Matheson crankpins, it may be mentioned, are oiled in the same way, but the connecting rod caps are cast with scoops.

The Columbia connecting rods, also the Pope-Hartford, are provided with oil scoops, and in fact this method of oiling the crankpins seems to be gaining ground where it is not superseded by some system of continuous flow. The Pope-Hartford car has plain bronze bearings in engine and gear box, and oil pockets over them, but this year there are wells under all these bearings, which fill themselves and keep the shafts oiled in case the splash temporarily fails.

The Corbin connecting rods have hinged caps at their lower ends, and the plane of division is inclined to make the nuts easy of access through large hand holes in the upper half of the crankcase. Contrary to usual practice, the shaft is not hung from the upper half; the cylinders are secured by through bolts going right through the oil pan, and the partitions in the latter are arranged to resist the pull of the bolts. The end bearings are ball, as formerly, and the intermediate bearings are supported by the oil pan partitions, and have top caps bolted over them, with large oil pockets. One motor, the two-cylinder Northern, was noticed with plain bearings and grease cups, a practice that is still considered good.



THOMAS MAIN BEARING — OLDS BUILT-UP CRANKSHAFT

Two-Wheelers in the Show

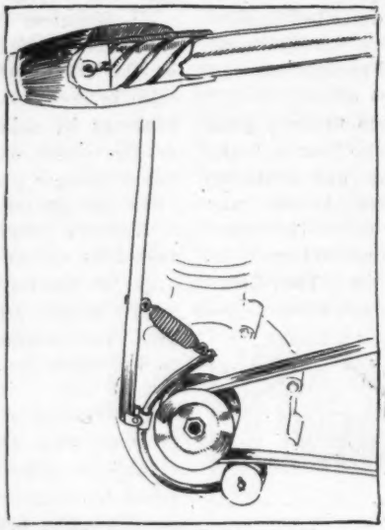
THE evidence of the growing popularity of the motor cycle that was presented by motor cycle alley in the Madison Square garden show last month and which came as a revelation to many who have not been following the developments in this direction very closely is strengthened by the showing of the little two-wheelers found in the annex of the Coliseum this week. More than a dozen different makes are represented, and, contrary to the condition at the New York exhibition, all are of domestic manufacture. In the east about one-half of the machines were imported and were displayed by agents. It is noteworthy that the machines on exhibition are not new makes, introduced now for the first time, but in nearly every case are improved models of well-known makes. The tendency toward twin-cylinder engines and vertical single cylinders is pronounced.

Notable tendencies in motor cycle construction as developed after inspection of the many machines on exhibition are increase of power, addition of twin-cylinder models, use of the main tank for gasoline only, provision for use of dry battery cells of standard size, strengthening of spring forks, enclosing reducing gears, and a general lowering of frames or saddles.

Although interest in two-wheel motor cycles has increased remarkably in the last year, the tri-cars that are so popular in Europe seem barely to hold their own in America, and only a few examples are displayed by three or four makers. Only one parcels delivery three-wheeler is seen. Probably the lack of progress in this direction is due to the condition of American roads, which are often rough in the middle, while the two tracks in which wagon wheels run are smooth enough for the two tracking wheels of the bicycles. Predictions are freely made that a great wave of motor cycle enthusiasm will sweep the country, particularly the middle west, in the next few years.

Magneto ignition is beginning to gain a foothold, one maker equipping it regularly and others fitting the magneto instead of batteries upon order. Machines built from standard motors and parts, such as compensating sprocket, coaster brakes and spring forks, are increasing noticeably in number.

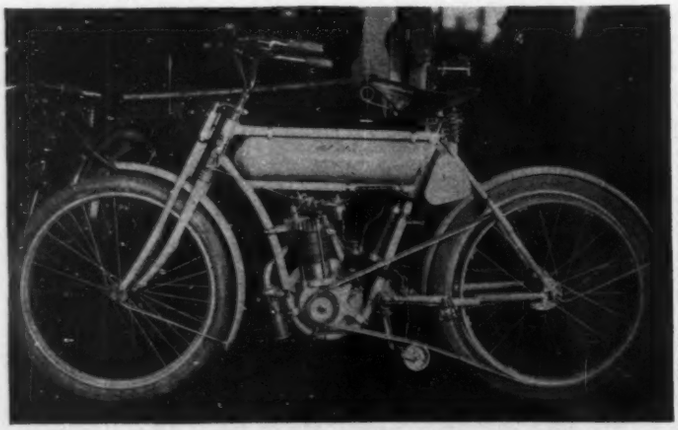
Foreign machines have not yet gained a foothold in this section, but are just being introduced, one or two Chicago agencies having been established lately for French and German makes. In the motor cycle line, as in the matter of motor cars, the present show is pre-eminently an American affair. Nevertheless, the influence of foreign practice is beginning to be apparent. Two-speed change gears and multi-cylinder engines, with all cylinders vertical, have not made their appearance, nor is there any example of shaft drive with bevel gears, such as were seen at Madison Square garden. Practice in driving means is about equally divided between belt and chain. The leading makers all have their own special forms of spring forks, and there is no indication that any superior type has yet been evolved with a probability of becoming standard.



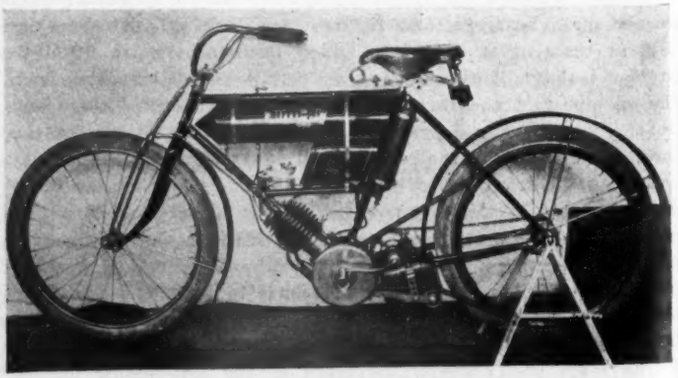
ARMAC GRIP EXCELSIOR TENSION

Unlike the situation in the motor car industry, standardization has not yet even begun to make itself manifest in the motor cycle branch. There is great diversity of design in frames; engines differ greatly, not only in form and arrangement of cylinders, but in the manner in which they are disposed in the frame. There is a variety of forms or driving-belt tension regulating devices employing idlers; fuel tanks are diverse in form and construction, one maker at least employing cold drawn steel tanks. Coils, oil reservoirs and mufflers are placed in nearly all conceivable positions on the frames, but most of them are ararnged to be reasonably accessible.

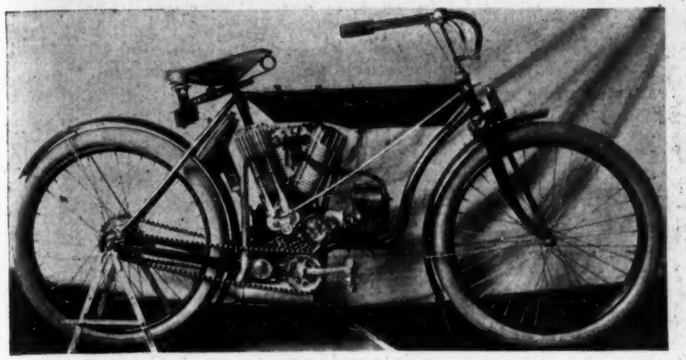
There seems to be as much difference of opinion regarding some points in motor cycle design as there is in motor car design, although practically all the makers are agreed on general principles. There has been less effort to make heavy machines in this country than abroad, and the multiple cylinder proposition has only begun to assert itself. Except in rare instances makers have not sought to go beyond 3 to 5 horsepower, probably for the reason that the American roads are not of a character to permit the high rate of speed that could be secured were the power materially increased. The advent of better roads might



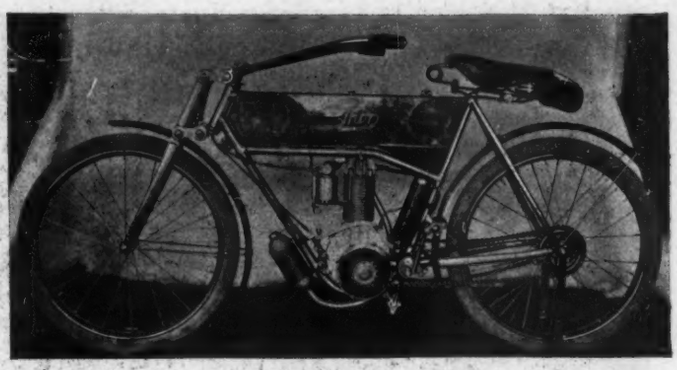
SINGLE-CYLINDER MARSH



THE THOMAS AUTO-BI

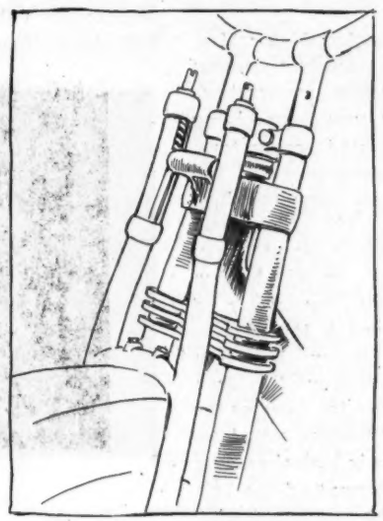


READING-STANDARD DOUBLE CYLINDER



THOR, MADE IN AURORA, ILL.

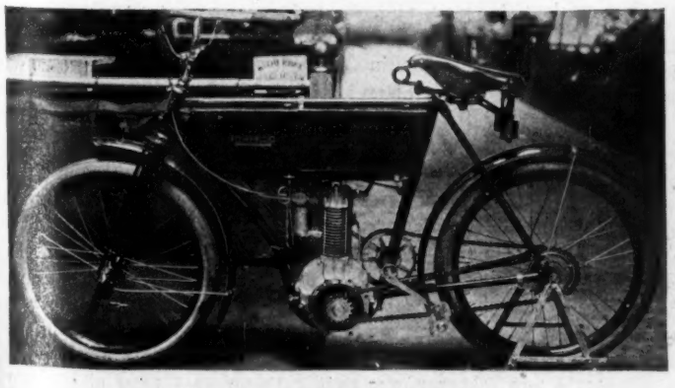
have a beneficial effect on the motor cycle industry. There have been many changes within the past year, and as proof that designers have kept pace with the procession an examination of the 1908 models is enough to convince the skeptics. These models are of all kinds and descriptions, including the single wheel, tandem, tri-car, delivryvan, and tri-cars with auxiliary seats. The powers plant of these models are of the single, double, four and eight-cylinder type, and show such modern improvements as mechanical intake valves operated by the same cam as the exhaust, magnetos, sight feed lubricators, Schebler carbureters, Hess-Bright ball bearings on the crankshaft, and in one model roller bearings are used for both crankshaft and crank pin bearings. There is a decided tendency toward an increase of power and friction-eliminating devices. In frame design the trend is toward lower seats, slightly increased wheel base, grip control, long handle bars, spring forks, lowering of battery boxes, tool compartments and a general refinement in machine work as well as in finish.



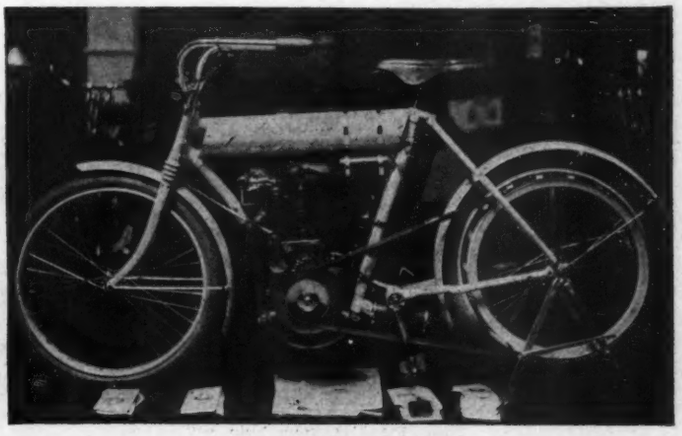
HARLEY DAVIDSON FORK

There are a number of important improvements this year in the popular Indian motor cycles, made and shown by the Hendee Mfg. Co., of Springfield, Mass. Four models of bicycles and one tri-car are shown. In the first place, the power of the different models has been increased—the former 2¼ horsepower to 2¾ and the double-cylinder 4 to 5 horsepower. This has been accomplished by increasing the bore of the cylinder ⅛ inch. The 3½-horsepower model that heretofore has been made only as a special model has this season been added as a regular stock size. The position of the saddles has been lowered by lowering the top of the gasoline tanks. A new and exclusive feature is the mechanical operation of the exhaust valves. Another is an oil gauge attachment fitted to the crankcase and having a small glass tube through which the height of oil in the case can be seen at a glance. A patent leather mud-splasher has been fitted to the lower end of the front mud guard, and wide, heavy rubber pedals give a secure rest for the feet. The piston is now formed with a large central peripheral groove that prevents warping from the heat. In the front edge of the connecting rods is cut a groove that catches oil as the rod dips into the oil. The oil flows down this groove and enters an oil hole leading to the wristpin. The spring fork attachment has been increased in length to make the action doubly easy. Option is now given on the standard gear drive, or on the chain drive, and also on the regular Indian battery box or a new double form of box to hold three No. 6 dry cells, which may be procured anywhere.

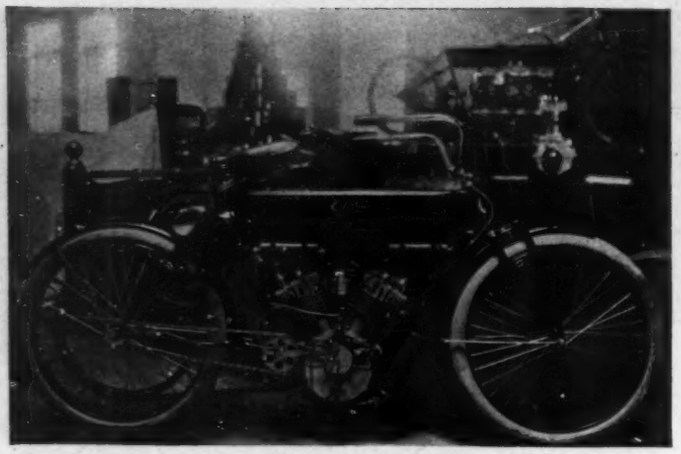
Marsh motor cycles, made by the American Motor Co., of Brockton, Mass., have been greatly changed throughout and a new double-cylinder model has been added. This new model is of 6 horsepower, having two cylinders of 3¼ by 3¾ inches bore and stroke, set at an angle of 90 degrees, the rear cylinder being in line with the seat mast and the front one in line with the forward reach of the frame. The machine weighs 150 pounds and has a wheelbase of 56 inches and frame height of 20 inches. A gear ratio of three to one affords a speed range of 5 to 65 miles an hour. A special feature of the engine is a double jet carbureter that permits of making adjustments for the two cylinders independently. A push plug ground wire terminal for each engine permits either cylinder to be cut out when testing the other. By means of the new special yoke clamps provided, the intake pipe can be taken from the cylinder head almost instantly by the loosening of a single nut. A new double ball timer prevents adjusting the timing of the two cylinders differently. For convenience in trying the engine, a stand is attached to the rear axle, which, when lowered, supports the rear wheel clear of the ground and when raised is hooked to the end of the mud guard. The three-leaf flat spring fork has been strengthened and improved, being made so that its line of curvature is a con-



TORPEDO, A WESTERN MAKE



ARMAC, MADE IN CHICAGO



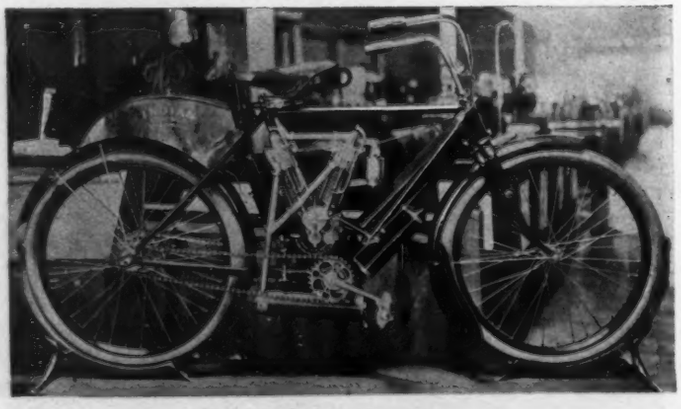
CURTISS, WITH DOUBLE-CYLINDER

tinuation of the front mud guard line. The forward standards are hinged to the spring and bear directly on the front axle. Another new Marsh model has a single-cylinder 2¼-horsepower vertical motor and weighs complete only 100 pounds, it is claimed. It has a wheelbase of 54 inches and the wheels are fitted with Palmer 26 by 2¼-inch tires.

The Torpedo motor cycle, made by the Hornecker Motor Mfg. Co., is a new make that is exhibited in two models. General characteristics of both are a double top bar frame construction, crankhanger placed above the driving chain, tank containing gasoline, oil, battery and coil, and a new patented spring fork. Both models have Thor engines, one of 2¼ horsepower and the other of 3 horsepower. Wheels are 26 inches in diameter. The small machine weighs 125 pounds and the other 130. The frame is of loop form. Both have direct chain drive. In about thirty days a third model of the Torpedo will be out. It will have a 4-horsepower double-cylinder Antoine motor with carbureter of the same make, the Torpedo spring fork, and weigh 150 pounds.

A new double-cylinder model of the Harley Davidson has been brought out for 1908 by the Harley Davidson Motor Co., of Milwaukee. The motor is practically the same as the single-cylinder engine except that it has two cylinders set at an angle of 44 degrees to each other. Improvements in both the single and twin models for this year are a longer adjustment of the belt tightening idler, wider mud guards, spring forks reinforced with new and stronger brackets and forks made of heavier gauge metal and a new muffler cut-out. Option is given the purchaser on New Departure, Morrow or Thor coaster brake. The single motor is of 3¼ horsepower, set well forward in a loop frame in nearly vertical positions, and drive is by 1½-inch flat belt.

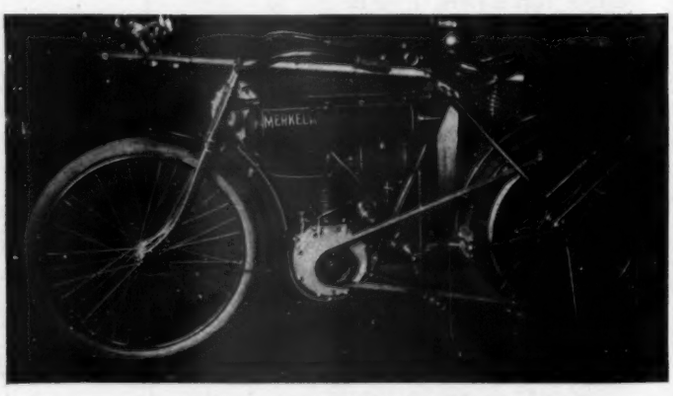
Two 1908 Manson motor cycles are shown by the Fowler-Manson-Sherman Cycle Mfg. Co., of Chicago, one with side attached woman's seat and third wheel. The new Manson has a 3-horsepower Thor engine set vertically and having internal gear drive that does away with the short engine chain. The frame is of heavy reinforced seamless steel tubing. A Thor compensating sprocket is fitted on the rear hub. A combination tank suspended from the top bar contains the oil, gasoline, and three ordinary dry cells. The weight complete is about 130 pounds and the speed from 5 to 55 miles an hour. Chain drive is used.



NEW TWO-CYLINDER INDIAN

The Excelsior is an attractive new make brought out by the Excelsior Supply Co., of Chicago. It has many new features, such as low saddle position, low center of gravity, long wheelbase and new Excelsior single-cylinder engine. The valve action of the engine has about one-third the usual number of parts and is so simple that two marks on the gears serve to time the entire engine. The valves are easily removable without taking off the carbureter or exhaust pipe fittings and is designed to eliminate possibility of loose cams and gears. The exhaust valve gear and cam are made integral. Gasoline and oil tanks are carefully fitted to conform to the frame lines and the filler holes are large enough to take the regular garage funnels. A special gasoline filter removes water and dirt from the fuel. The fuel tank holds two gallons and the oil tank sufficient lubricant for from 500 to 600 miles. The spring fork is designed to absorb the slightest shocks. Transmission is by 1½-inch belt with new system of tension regulation operated from the saddle and which exerts no pressure on the bearings.

Three Armac motor cycles are shown by the Armac Motor Co., of Chicago. They are in patriotic colors, one being enameled bright red, another white and the third blue. They have belt drive from single cylinder motor. A distinctive feature is



LATEST MODEL OF THE MERKEL

the forming of the seat mast into an oval section tank for lubricating oil, the tank hung from the top tube being used this season exclusively for gasoline. The oil is now fed to the engine by means of a small hand force pump attached to the seat mast instead of depending upon a drip feed oiler. The engine piston head has been enlarged and the flywheels made heavier to conform with the change. A new form of commutator control is used in the grip.

Single, double and eight-cylinder cycles are shown by the G. H. Curtiss Mfg. Co., of Hammondsport, N. Y. Three of them are world's record holders, the 3-horsepower single having made a record of 56⅘ seconds on the Providence track, the 6-horsepower double having created the straightaway mile record of 46⅗ at Ormond last January, and the 40-horsepower eight-cylinder holding the straightaway record of 26⅖, also made at Ormond in January. The last machine has the cylinders set V form with the motor lengthwise. Besides these motor cycles, the company shows a vertical four-cylinder engine for use on flying machines. The Curtiss engines have roller bearings, transmission is by V belt and the front forks are trussed like the French machines.

Two models of the new Light machines are shown by the Light Mfg. and Foundry Co., of Pottstown, Pa. They are fitted with Thor 2¼ and 3-horsepower vertical motors set in loop frames and drive respectively by chain and gear. The larger model has a spring fork. The tank has a 5-quart gasoline reservoir, 1 quart oil tank and space for three standard battery cells. The company announces that it will have ready for spring delivery a new 5-horsepower twin cylinder gear-drive motor cycle.

The 1908 Thor machines shown by the Aurora Automatic Machinery Co., of Aurora, Ill., has the new vertical cylinder motor secured at two points on the crankcase and a third point at the cylinder head to resist the increased strains of driving. The carbureter is lowered and leaves the head and upper part of the cylinder more exposed for cooling and renders the gasoline pressure more uniform whether the tank be full or empty. A gear-drive is enclosed in the flywheel case and runs on ball bearings, so that friction and noise are greatly reduced. The bearing surfaces have been increased in size. The new Thor spring forks are made straight and extended up to the level of the top of the frame head. Four levers connect the fork stem with the frame head. The cushion effect is secured from a piston and spring cylinder arrangement supplemented by coil springs that is interposed between the upper and lower pairs of levers. The piston has a packing that absorbs the light shocks, the severer shocks being taken up by an air cushion, while a spring buffer takes care of the recoil.

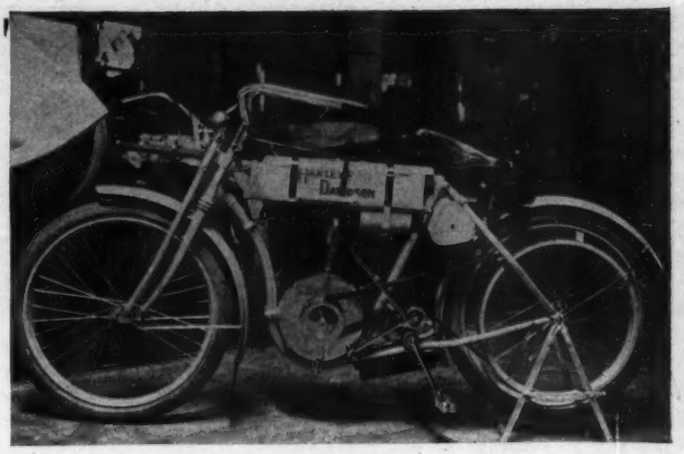
The 1908 Merkel, made by the Merkel Motor Co., of Milwaukee, is fitted with magneto ignition, like a number of the new foreign machines. It has a looped spring frame and is driven by a 3-horsepower vertical single-cylinder engine. The shaft runs on imported ball bearings. Long spiral springs in the rear stays of the frame carry the weight of the rider and absorb shocks. Transmission is by a 1½-inch flat belt.

The display of R-S machines includes four models, as follows:

EXCELSIOR, A CHICAGO MACHINE

One two-cylinder, one single-cylinder woman's tricar, one single-cylinder double diamond, and one single-cylinder parcel delivery van. A double float carbureter is a feature of the Reading Standard motor cycle. The object of the design is to avoid centrifugal action on the fuel by having the mixing chamber between the two float chambers. The motors are of the one and two-cylinder type, the double cylinder being set at an angle of 47 degrees, with valve chambers on opposite sides so the heat from the forward cylinder does not strike and heat up the rear. These motors have mechanical intake valves and are well made.

Three Auto-Bi machines are shown by the Auto-Bi Co., of Buffalo. This was formerly the Thomas Auto-Bi Co., but has been reorganized within the past week and the name of one of the first builders of motor cycles in America was dropped. The three machines shown are all of the same model, which has been considerably changed from the earlier models. The company is now preparing to make a hard push for business and will open a Chicago office soon. The single-cylinder engine is placed in an inclined position, with the center line of the cylinder in line with the bottom tube of the frame, which extends only to the head of the engine. The engine develops 3 horsepower. It has a crankcase that is split horizontally and permits the motor to be taken apart without removing it from the frame. By turning the bicycle upside down, the lower half of the base can be taken off readily by unscrewing four lug bolts. Drive is by link chain wound with leather, forming a belt that does not stretch and which can be repaired cheaply should one of the detachable links break. The former hand force-pump oiler has been replaced by a gravity feed oiler, which avoids trouble due to meddlesome



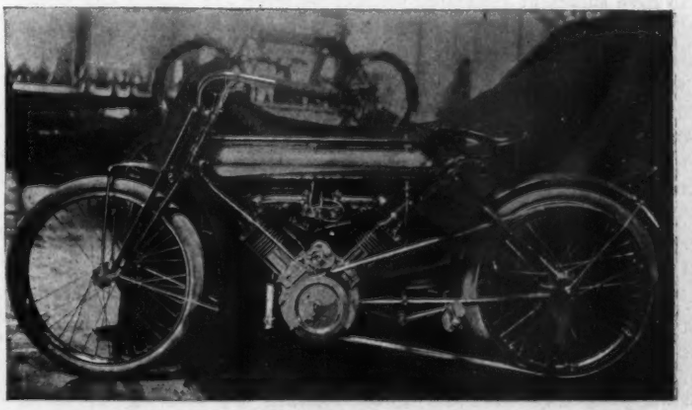
HARLEY DAVIDSON 1908 MACHINE

boys fooling with the pump. A novel feature that has recently been added is a small valve and lead attached to the gasoline tank, by means of which a small quantity of fuel can be introduced directly into the explosion chamber for starting in cold weather. This is supplementary to the priming device on the carbureter.

Yale-California motorcycles are shown by the Consolidated Mfg. Co., of Toledo, O. One of the characteristics of this machine is a flywheel that is placed outside of the crankcase. The Auto-Bi is the only other make on exhibition having this feature. All parts of the Yale-California are made and assembled under one roof. The engine has separately-cast base, cylinder and head, which are held together by four outside screw rods. The oiler, with glass cup, is attached directly to a lug on the base of the engine. The engine develops 2¼ horsepower and is set almost vertically in a loop frame. Drive is by flat belt running over a wood pulley. Spring front forks are fitted.

L. C. Chase & Co. are showing models of the Excelsior and Triumph machines built by the Excelsior Motor and Mfg. Co., of Chicago. The Excelsior already has been described. The Triumph machines, built by the Excelsior Motor and Mfg. Co., of ward and secured to the frame at the base and also at the cylinder head. The engine is placed low to give a low center of gravity and afford a low riding position. A cross tube below the tank stiffens the frame. The tank contains the gasoline, oil reservoir and battery. Long, upturned handle bars bring the grips within easy reach when sitting in an uprght position. Drive is by chain to a compensating sprocket.

Scattered throughout the building are all sorts of things that are used by motor cyclists. Most of the lamp manufacturers, such as the Badger Brass Mfg. Co., Gray & Davis and Edmund & Jones, are exhibiting lamps especially designed for motor cycle use. The Healy Leather Tire Co. shows motor cycle tires made from chrome tan leather, and the supply houses which carry motorists' apparel show such things as are demanded for road work by the devotees of the two-wheelers.



NEW DOUBLE-CYLINDER MARSH

The Commercial Exhibit

AMERICA'S first exhibition of commercial vehicles, in which an entire armory is given over to the display of the different styles of commercial vehicles, offers no greater characteristic than the presence of so many systems of friction transmission, the exponents of it being Lambert, Plymouth, Worth, Weeks and Meiselbach. With the exception of the Weeks car all of these are 1, 2 and 3-ton vehicles, the Weeks being a light delivery wagon. The presence of friction transmission in these five is all the more important when viewed in the light that several of them have been employing this system for not a few years, and the success attending its use has been so great as not only to warrant its pretension, but to adopt it for vehicles of all load-carrying capacity. The argument with these friction-drivers is "no gears," all of them pointing with pride to the fact that from the motor to the rear axle there is not a gear excepting in one case. All of them consider this a talking point, and not one of them but what has the rear end of the truck blocked up and an electric motor fitted so that the exact working of the transmission can be shown. Practically the invariable practice in this system is to use side chain drive and continue the crankshaft to the motor well back towards the rear axle, where it carries one or more friction disks, which contact with friction wheels on the cross shaft. In the Worth car, built by the Worth Motor Car Mfg. Co., Evansville, Ind., the crankshaft, continued to the rear, carries rigidly secured to it a pair of opposing 36½-inch cast iron disks, which bolt to flanges on the shaft. The jackshaft or cross shaft lies midway across between these disks, and it is not a continuous shaft, but two shafts, one extending from the sprocket on the right side inwards to a bearing bracket alongside of the continued crankshaft, and the other similarly placed on the other side of the truck. These shafts are carried at their inner ends on roller bearings fitted in ball and socket cages, and the cages carried on an inverted U piece, which spands the continued crankshaft. The friction wheels slide on these cross shafts, and their diameter, 20½ inches, is a little less than the distance between the opposing faces of the disks on the continued crankshaft. When driving forward the right friction wheel is forced backwards against the rear disk and the left friction wheel forward against the right disk, thereby imparting the same movement to the chain sprockets on the other ends of the jackshaft. This swinging is accomplished by turning the inverted U bracket which suports the inner ends of the jackshaft, which movement is enough to give sufficient frictional contact between the wheels and disks. For reverse speeds the swinging U bracket is partly rotated in the opposite direction, so that the right friction wheel engages with the forward disk and the left friction wheel with the rear disk. It is apparent from this that when driving either forward or backward the drive to one of the rear road wheels is through the forward disk and one of the friction wheels, and the drive to the other through the rear disk and the other friction wheel. The friction wheels have wood paper or fiber tires 1½ inches wide. Because of swinging the inner ends of the jackshaft halves the bearings on the outer ends of these shafts are of the roller type, carried in ball and socket bushings, so that strain is not placed upon them with the swinging of the jackshaft halves. A novel method is used in this friction transmission of sliding the friction wheels on the halves of the jackshaft, which is operated through a small-diameter wheel beneath the steering wheel on the steering column. This wheel is carried on a concentric tube surrounding the steering column, and has on its lower end a bevel pinion constantly in mesh with a similar bevel on a horizontal shaft extending rearward on the car to a tranverse slide carried over the cross shaft. In this slide is a rack attaching at each end through brackets to the hubs of the friction wheels. The rod from the steering column carries a pinion, which meshes with the rack so that by turning the wheel on the steering column to the right or left the driver gets his variations in speed. The Worth transmission is an example of the divided swinging jackshaft style, and the reader will a little later on be introduced to another style, in which the jackshaft is rigid and the disks on the continued motorshaft move backwards or forwards. Apart from its friction transmission the Worth car is a stoutly constructed industrial vehicle, having as its power source a four-cylinder vertical engine of the four-cycle type, with cylinders cast in pairs, and valves on both sides. Motor lubrication is by an oil reservoir, with pump in the base of the crankcase. Battery ignition and water cooling are employed. The framework is of heavy channel construction, specially reinforced amidship by a peculiar construction, in which the front half of the frame is carried straight to the rear and the rear half of greater width parallels it in the center portion of the car and at the dash narrows to and is riveted to the front half pieces, thereby giving the same effect as a touring car frame, which is narrowed at the dash to increase the turning angle of the front wheels. The car uses I-beam front axle, square section rear axle, and has camel-hair brakes, acting on the rear drums, 10 inches in diameter and 2½ inches wide. The chassis is made for a useful lead of 2 tons, with a carrying platform 12 feet long and 6 feet wide. Its wheelbase measures 134 inches and its 34-inch wheels carry 4-inch Swinehart tires.

Weeks Delivery Car Has a 1,000-Pound Capacity

The Weeks light delivery car, with load capacity for 1,000 pounds, and horsepower rating at 20, follows second in a resume of commercial vehicles because of a close resemblance of its friction transmission to the Worth. The Weeks continues the motor crankshaft to the rear, carrying thereon a pair of opposing cast iron disks, and between these is a two-piece jackshaft on each half of which is a sliding friction wheel. As in the Worth, these friction wheels do not occupy the entire space between the disks, but sufficient room is left so that one wheel is rocked forward to contact with the forward disk, and the other wheel rocks back to contact with the rear disk for forward speed and vice versa movement for reverse drive. The vital difference between the Weeks and the Worth is that the Worth oscillated the inner ends of the jackshaft halves forward and back, but on the Weeks the jackshaft is supported beneath at each end on a trunion, and for engagement the entire half of it is rocked forward or backward, during all of which time the shaft is at right angles across the car and not in an angular position. The control of this transmission is through two pedals and a side lever. One pedal gives reverse speeds, another forward speeds, and moving the lever forward gives slow travel and moving it back fast travel. This car is an example of the rocking rather than swinging united jackshaft, but it is not in the transmission solely that the Weeks car deserves attention, rather the motor must be looked at, which is an air-cooled opposed two-cycle construction placed horizontally under the frame and in rear of the front axle. The motor is vapor and air-cooled in that the mixture entering passes through

the pistons to the crankcase, and is later bypassed around the pistons to the combustion chamber, thereby cooling several motor parts before it is exploded. Its cylinders have 4-inch bore and stroke and besides rectangular-shaped flanges circling the cylinder bores there is a miniature fan directing a transverse draught on the cylinder heads. Structurally considered the car has a light running gear, with 38-inch wheels, carrying 2½-inch tires; internal brakes with cork inserts acting on rear wheel drums; force feed lubrication; platform rear spring suspension, and an 84-inch wheelbase.

Meiselbach Using Simple Friction Transmission

A. D. Meiselbach in his 1-ton truck uses a rather simple friction transmission, giving but one speed forward and one reverse, and in order to make up for the lack of variation of speed in the transmission he has fitted an extra powerful motor of 30 horsepower, so that it can be operated slowly or as high as 1,200 revolutions per minute, the variation in motor speed fully compensating for the lack of variation in the transmission. On the Meiselbach transmission the bevel friction surface is used. The crankshaft, continued to the rear, carries a pair of bevel friction cones, which can be moved on the shaft forward or back. These cones engage with large-diameter friction disks with cone surfaces carried on the inner ends of the jackshaft halves. The jackshaft halves are rigid, as are the large elements they carry, so that in this transmission an entirely new principle is encountered, first, the rigid jackshaft, and, second, the beveled surfaces. On forward speed one of the friction cones on the continued crankshaft is pushed so that it contacts with the right and left disks, and at which time the other cone is out of contact. For reverse speed the second cone is moved into action and the first one withdrawn. Due to the fact that the cone on the continued crankshaft engages simultaneously with the one on the right and the other on the left half of the jackshaft, an opposite rotation is imparted to the halves of the jackshaft, necessitating the introduction of a countershaft, which parallels one-half the jackshaft on the left and is driven therefrom by spur gear. The outer end of this countershaft carries the sprocket for chain drive. The sliding cones are paper pulleys, consisting of strata or layers packed tightly, whereas the friction bevel disks on the jackshaft are iron castings, with a 5-inch bevel angling at 71 degrees. The control of this transmission rests with a side lever and a pedal, the side lever for forward speed, the pedal for reverse. In the 2-ton truck the disks have a 22-inch diameter and in the 3-ton a 24-inch cross measurement. Backing up each of the friction disks on the jackshaft halves as well as the sliding cones on the continued crankshaft are 6-inch ball end thrust containing ½-inch balls. The two-cylinder motor employed is conventional with its 6-inch bore and 4½-inch stroke. It has half of the crankcase formed integrally with each cylinder. Valves are mechanically operated, water circulation is by a grease pump and the lubricator is carried above the crankcase. The brake drums are 18 inches in diameter, with 2-inch face, and are in the form of bands contacting on drums forming the periphery of the friction disk on the jackshaft halves. As usual in most friction-drive cars the differential is obviated, and the only instance of gears is in case of the counter-jackshaft. Both axles are Timken construction, drive is through Whitney chains, Firestone tires are fitted, and 34-inch wheels are in use on the 1 and 2-ton trucks, but 36-inch wheels on the 3-ton truck.

Four-Cylinder Motor on the Plymouth

The Plymouth friction drive truck with its 4,000-pound capacity carries a four-cylinder motor under the footboard, and in its transmission employs a pair of sliding friction disks on the continued crankshaft as well as a pair of sliding friction wheels on the halves of the divided jackshaft. In the transmission the crankshaft continued towards the rear axle, connects with a shaft having on its end friction disks rigidly positioned so that the disks move forward and backward together, being shifted by pedal. The jackshaft, as in the Meiselbach, remains stationary. When driving ahead the forward disk is pushed upon the friction wheels and when reversing the rear disk is pushed against them. On a forward or reverse drive one disk does the driving, and it contacts with both friction wheels, the result of which is that one wheel travels in an opposite direction to the other and a counter-jackshaft is necessary on the right side to reverse the speed and give the proper drive to the rear wheel on the right. This is the same as done in the Meiselbach except that in it the counter-jackshaft is on the left. The two disks on the continued crankshaft are moved back and forth by a yoke spanning the shaft between large ball thrust collars. The disks are made of alloy metal, are 22 inches in diameter, and bolt to large flanges on the shaft, and the friction wheels have tires of tar board, with ⅜-inch radial depth. The car has any number of forward speed changes and as many reverses. Its motor is a 40-horsepower conventional design, with 4¾ by 5-inch cylinders; ignition is by storage cell, with multi-unit coil, and the control is through brake reverse and forward speed pedals, and the side lever for giving high or reverse speeds when traveling ahead or backward. The brakes are double-expanding shoes acting on the rear wheel drums and axles are of Timken construction. The wheelbase on the 2-ton truck is 103 inches and wheels are 34 in front and 36 in rear.

Lambert Example of Friction Drive

The last example of friction driven industrial vehicle is the Lambert, which stands in a class of its own because of the differences of design used in its system, in that it uses but one friction disk, one friction wheel and a solid jackshaft from end to end. The crankshaft is not continued to the rear but carries immediately in rear of the crankcase a large diameter friction disk faced with a special friction alloy and protected against end thrust by a very large diameter ball thrust bearing between it and the crankcase. The cross shaft rocks forward and back when the friction wheel on it is engaged with the disk, and at every portion of the rock the shaft is at right angles across the car. On the ends of this cross shaft are small sprockets for chain drive. The friction wheel is moved across the face of the disk by a side lever and arrangements are such that as great a range of reverse speed is not permitted as is allowed on forward drive. The jackshaft is rocked forward by pedal with ratchet retainer. In order to stiffen the friction disk at its outer edges and to prevent any possible springing when

TWO EXHIBITS IN SEVENTH REGIMENT ARMORY

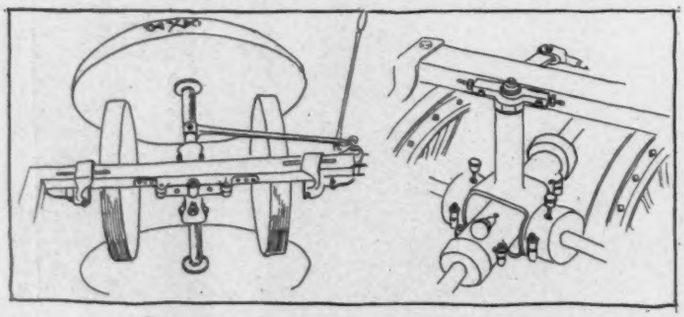
PROMINENT IN THE COMMERCIAL SHOW

STUDEBAKER ELECTRIC INDUSTRIAL CARS AT THE SEVENTH REGIMENT ARMORY SHOW, CHICAGO

driving on high speed, at which the wheel contacts with the disk at its periphery, a pair of backing pulleys are positioned alongside of the rear of the motor so that they bear upon the reverse side of the friction disk, thereby holding it rigid at all times. In addition to this backing up process the disk is heavily ribbed with radial spokes which strengthen it materially. Lambert trucks at present are built in ton, 2-ton and 2½-ton varieties, the larger styles fitted with a 35-40-horsepower Rutenber motor and the smaller truck with a 20-horsepower two-cylinder opposed motor carried transversely in front. The framework is a particularly stout construction and dual semi-elliptic springs are arranged which have proven very satisfactory during the past year. Owing to the few parts in connection with this truck its ease of operation is one of its chief characteristics. Its ability to pull loads with a single friction disk and one friction wheel has been followed closely from time to time and the truck has proven conclusively that its transmission parts are of sufficient number to care for the heaviest road use.

Light Air-Cooled Delivery Cars

Two trucks which are closely allied in that they use air-cooled four-cylinder four-cycle motors and are intended for light service are the Franklin, manufactured by the H. H. Franklin Mfg. Co., and the other built by Sayers & Scovill, of Cincinnati. The Franklin truck uses a 12-horsepower engine with 3¼-inch cylinders, having it located accessibly beneath the footboard and the driver's seat. The engine is the same as used in the light touring cars and its construction is familiar to Motor Age readers. Transmission of power from the motor passes through a disk clutch, sliding gear transmission and shaft to the rear axle. The running gear includes the inverted arched front axle attached to the frame through elliptic springs which are clipped beneath the axle. The half-ton model uses the same air-cooled engine as employed in the 1-ton machine. Wheels are 32 inches in diameter, wheelbase measures 76 inches and the useful platform on the stake body is 6 feet long and 5 feet wide. Sayers & Scoville in their 1½-ton truck employ a 24-horsepower air-cooled motor with separately cast cylinders cooled by circular flanges and having mechanically operated intake and exhaust valves in the cylinder heads. The motor is mounted longitudinally in front and placing the footboard and seat above it as done in the Franklin greatly increases the possible carrying space in the vehicle. Motor lubrication is by a four-feed oiler, ignition is by jump spark and all motor parts are especially constructed. Speed variations are through a sliding gearset giving three forward speeds and reverse and the differential is integral with the transmission so that side chain drive may be employed. The jackshaft is carried on annular ball bearings encased in steel castings which are directly connected with the radius rods, thereby removing driving strain from the frame. The clutch is an expanding leather faced member. The features of the running gear are worm and nut steering gear, spark and throttle control on the hand wheel, half-elliptic front springs, full-elliptic rear springs, I-beam construction in the forward axle and a 2 by 5-inch ash frame armored with a 5-inch steel plate ¼-inch thick. A double set of brakes is employed.

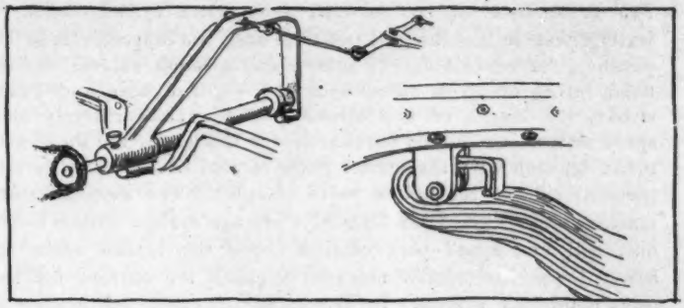


TWO VIEWS OF THE WORTH TRANSMISSION

One of the Two-Cycle Exponents

The Coppock 1-ton truck, one of the two-cycle exponents at the show, has its motor consisting of a pair of separately cast cylinders with copper water jackets, the motor located vertically in front under the footboard and seats. Flexible connection with the motor is through an expanding clutch in the flywheel and changes in speed operating on the progressive principle give three forward variations. Final drive is by side chain from the jackshaft sprockets to the rear wheels. The car framework of nickel steel stock has the side pieces slightly offset at the dash and uses two sub-frame members for supporting the motor and gear boxes. Front and rear axles are nickel steel stock, the forward one formed in I-beam section, and the latter of square section 1¾ inches to the side. Timken rollers carry the front and rear wheels and supporting the frame on the axles are 40-inch semi-elliptics in front and a platform system in rear. Steering is through a worm and sector gear with tie rod in front of the axle and the steering column placed at a slight angle on

the right carries spark and throttle on the wheel. Three and a half and 4-inch solid tires are used on the 32-inch road wheels. Die cast nickel babbitt bearings are used in the motor, American roller bearings for the jackshaft and Timken rollers in the other parts of the car. Strength in every detail has been aimed at by the general use of nickel steel and control rests in a four-brake equipment, two of which are clamping bands acting on steel drums on the jackshaft while the remaining two are clamping steel shoes acting on 10½-inch drums on the rear wheels. The Coppock two-cycle motor has cylinders with 4½-inch bore and 5-inch stroke, which cylinders are machined on the outer surface before the copper waterjackets are attached, to insure good iron and to maintain a perfectly round cylinder under all conditions, the even cylinder wall thickness meaning even cylinder expansion, and contraction. The motor operates along three-port principles, receiving its mixture from a carbureter on the left side and taking it into the crankcase which is formed with a gastight compartment for each cylinder. The gas from the crankcase reaches the cylinder through a bypass channel on the right side of the motor, the oblong plates covering these passages appearing in the illustrations on these pages. The cylinders have 16-ounce spun copper jackets held in place with a hexagon bronze nut at the top, and a spanner nut of the same material at the bottom, allowing easy access for cleaning the jacket. The weight of the cylinder finished is 16½ pounds without jacket. The cylinders are finished by reamer; piston and rings are ground to size. The lubrication of the pistons and connecting rods is positive by force feed oiler gear-driven in the following manner: One oil pipe leads to a boss on the side of the cylinder, leading to a groove on the inside of the cylinder which is 3-16 inch wide and ⅛ inch deep. The groove is cut from one side of the piston pin extening around to the opposite side. In this manner it entirely surrounds the piston except the width of the pin, which is 1⅛ inches. On the movement of the piston this groove is not uncovered but comes to ⅛ inch of each end of the piston on its up and down stroke. The piston pin is drilled so when the crank is in a vertical position oil is fed to the upper end of the rod. When the crank is in a horizontal position the oil hole is drilled in the pin to register with the tube fastened in the channel of the connecting rod, which leads to its lower end. The crank journals are fed by hard grease cups placed upon the dash in plain view of the operator, and lead to the engine in the ⅜-inch eighteen gage copper tubing. Cooling is by vertical tube radiator carrying 176 feet of tubing. Assisting this is a four blade fan



WEEKS ROCKING SHAFT AND GIFFORD SPRING SHACKLE

belt driven off the front end of the crankshaft. A neat belt adjuster is achieved by threading the standard carrying the fan into its supporting bracket and using nut and locknut for retaining it in any desired position. The expanding bronze ring clutch acts within the small diameter drum placed on the rear face of the flywheel. This drum has a diameter of 10 inches and a width of 2¼ inches. To insure gradual clutch engagement with an absence of gripping a series of cork inserts is used in the bronze band, these cork portions forming 8 per cent of the band surface. Looking more closely at the band it is noted it is a two-part one, with the halves hinged together at one side and supported on a carrier. At the other end are the expanding arrangements. Connection from the clutch to the gearbox is through a drive shaft, with universal joint immediately in the rear of the flywheel. The transmission is standard, with its two shafts carried side by side and with gears formed of hardened nickel steel and made with 1-inch face and six pitch. The bevels for transmitting to the jackshaft are made from the same metal but have four pitch. The jackshaft has a square fit into the differential gears and carries on its ends small size sprockets for the chain drive. To facilitate chain adjustment radius rods extending between the outer bearings of the jackshaft and the rear axle are used.

An Example of Stout Construction

In the Gifford-Pettit 4-ton truck the buyer finds examples of some of the stoutest construction of the show, by which is not meant useless bulk in weight but a due conservation of material according to the possible strain and load on the parts. The four-cylinder motor, with its separately cast cylinders and opposite valves, is located so that two of the cylinders are in front and

FRAYER-MILLER AIR-COOLED INDUSTRIAL CARS WITH SELECTIVE GEARSETS

two in the rear of the forward axle. Each cylinder with its waterjacket is an integral casting and has opposite side expansions for containing the intake and exhaust valves. Its official rating of 35 is based upon the 4¾-inch bore and 6-inch stroke, the length of this stroke giving a comparatively slow speed motor. One of its peculiarities is the use of the make-and-break ignition with the igniter parts carried in a plug fitted into the rear side of the intake valve chamber. The supplementary ignition system takes the form of a storage system with a multi-unit coil and spark plug carried above the intake valve. A Simms-Bosch low-tension magneto supplies the current for the make-and-break system. In the cause of motor lubrication is an eleven-feed McCord oiler chain-driven from the camshaft and carried low down on the left side of the motor. Flexible connection between the motor and transmission is in the form of a leather-faced cone clutch carried in the flywheel, while in rear of this comes the sliding gear transmission giving three forward speeds and one reverse and having the countershaft idle when running on the high. The case is carried in a two-part aluminum housing supported on the deeply dropped sub-frame. To the rear of the transmission case is the differential housing and the enclosed jackshaft. Drive is by side chain and for adjustment purposes are the usual turnbuckles attachment in the radius rods. Not of little importance is the relative position of the wheels and frame, together with the sub-frame. Without load the frame is higher than the tops of the wheels, but having the motor and transmission on the low sub-frame the center of gravity is kept well down. The frame is channel steel of 5 inches vertical depth and 2-inch lips, the channel facing outwards. Front springs are 48-inch semi-elliptics with fourteen leaves, each 3 inches wide. The rear springs are the same style, 52 inches long and have fifteen leaves 3½ inches width. The rear end of the front and rear springs have the two long leaves bent over, forming a loop in which is the shackle pin, the construction giving the same action as a sliding block attachment. Axles are of Timken construction, made very heavy and the 36-inch wheels carry 5-inch solid rubber tires in front and 3½-inch dual tires in the rear. The steering gear is of the worm and segment variety, with control parts on the right, the column being practically vertical. Spark and throttle controls are on the wheel, both sparks being operative through the same lever. In the breaking system are internal and external members acting on drums 15 inches diameter with a 2½-inch face, the internals having bronze shoes and the external bands lined with camel' [illegible]. A large gasoline tank is carried over the rear two cylinders of the motor and the seat is directly above this. All told, the truck is a most worthy production, being as it is the first to be turned out by the Gifford-Pettit Mfg. Co., Chicago.

Frayer-Miller Fits Its Standard Air-Cooled Motor

Used in the Frayer-Miller trucks is an air-cooled motor in design identical with that used in the touring cars and having as its most conspicuous features separately cast cylinders with detachable aluminum air jackets, into the tops of which is forced an air current created by a rotary blower on the front of the crankshaft. The motors used for the big trucks have a rating of 50-horsepower, although in some of the smaller vehicles a 24-horsepower motor is used, the 50-horsepower being for 3-ton trucks and those of greater capacity. The 24 has cylinders with 4 1-16-inch bore and 5⅛-inch stroke. Within the flywheel is an expanding clutch, speed changes are through a selective transmission offering four forward variations and one reverse, final drive is by roller chains from the jackshaft sprockets. This company is one more example of the class that believes in using side chain drive on commercial vehicles, although it pins its faith to shaft transmission in pleasure cars. Strength has not been overlooked, the rear axle having a solid forging 2¼ inches square. The frame is a cambria steel channel 6 inches deep with a 2-inch channel lip. The countershaft is supported in cast steel ball bearing housings at its outer end. This truck, with a 2½-ton carrying capacity, is made with stake body of different lengths to suit the requirements of the buyer. Breaking is through two independent sets consisting of expanding members on the rear wheels and a transmission brake in front of the differential housing. To assist in the demountability, universal joints are placed at two points in the drive shaft and a jaw coupling is interposed between the clutch and transmission. The control parts are centered at the right side of the car and are well grouped around the vertical steering column. By locating the motor beneath the driver's seat and the footboard a good sized load-carrying platform is obtained.

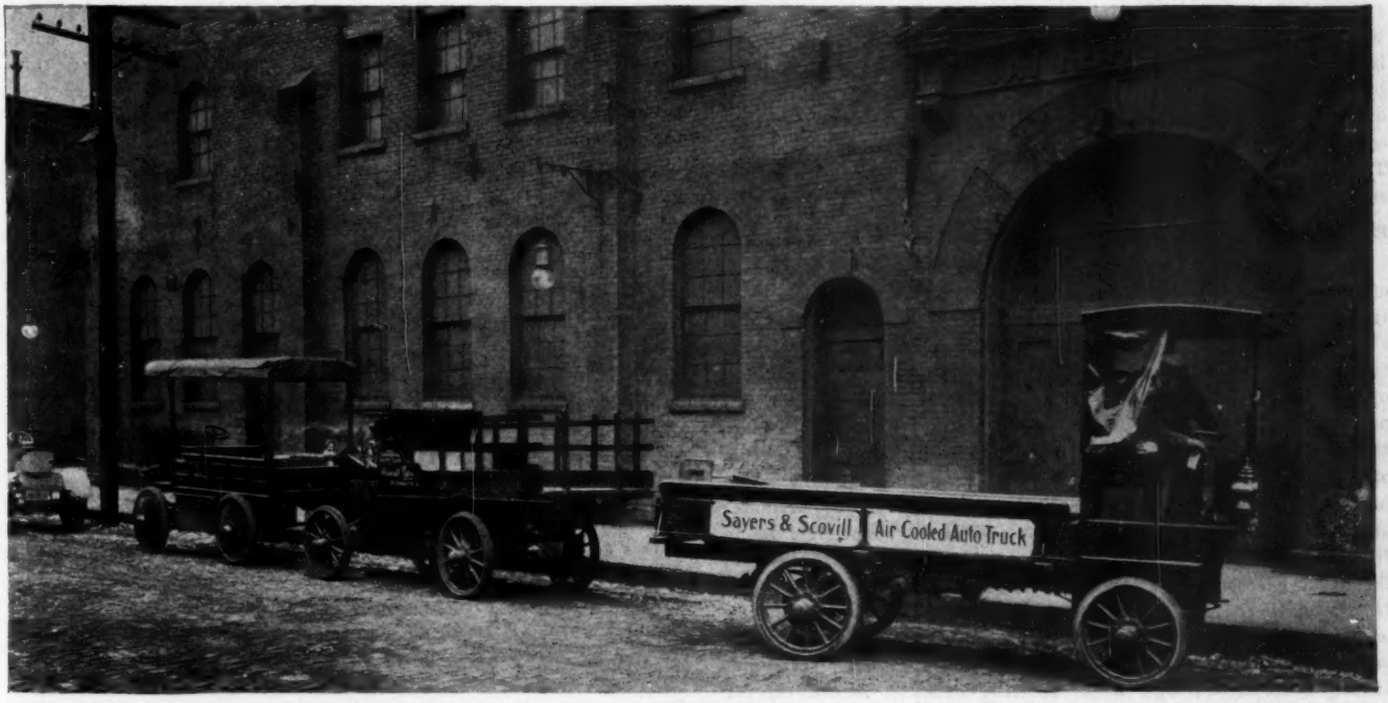
RELIANCE TWO-CYCLE TRUCKS WITH DIFFERENT BODY STYLES

Types of the Electric Trucks Shown

Some of the lightest electric vehicles shown are those of the Pittsburg Motor Vehicle Co., one of which has a 750-pound carrying capacity, with a one-third overload. This wagon has a speed of 11 miles per hour. Fifteen hundred pound and 1½-ton trucks are also manufactured by the company, both of which

have double motor drive with roller chain communication with rear wheels. I-beam axles are used and both have a one-third overload capacity. In the 750-pound vehicle one motor is used for driving the rear wheels, the communication of power between it and the wheels being by single chain to the differential.

The leading characteristics of the Pope-Waverley industrial electrics is the use of one motor on the small vehicles and two motors on the larger ones. Motor suspension is in front of the rear axle, the drive thence being by side chains, whereas double reduction gears are necessitated in the single motor wagon. Regular battery equipment consists of forty or forty-two exide or national cells carried in underslung battery boxes. The Studebaker electrics follow through the complete drama of load carrying capacity from the little 800-pound delivery wagon to the 5-ton stake truck. Two motors are employed in the large trucks, whereas a single one suffices in the light delivery wagons. The 5-ton truck has two 80-volt 35 ampere motors; the battery contains forty-four cells of 19 M. V., eleven in each tray; the vehicle is claimed to have a mileage of 27 over reasonable surfaces. With this mileage the speed per hour would scarcely be greater than 7 miles. The 3½-ton truck with the same motor a 200 per cent overload when occasion demands, gives a big pulling force. Regulating the flow of current to the motors is a cylindrical controller giving five forward speeds and as many reverses. In this connection it should be noted that the control over the four driving motors is a good lesson in flexibility and a work that adds largely to the life of the car. In the 5-ton truck a reduction of twenty-five to one makes the 6-mile an hour speed quite possible. As usual with all vehicles in which the four wheels are used for steering an interconnection is established between the steering pivots whereby in turning a corner to the right the forward wheels are turned in that direction and the rear wheels in the opposite direction, both controlled through a hand wheel on the vertical column. Using the four wheels for steering allows of turning in a very small circle. Not content, however, with driving and steering through four wheels, braking is also accomplished in each by the use of a fiber band brake, in the application of which two pedals are required, one for the brakes on the front wheels, the others for those in the rear. The wheels are made from ¼-inch boiler steel and revolve on roller bearings. The motors, using the forward wheels for driving purposes only, are rather interesting



LINE-UP OF COMMERCIAL CARS OUTSIDE OF SEVENTH REGIMENT ARMORY SHOW

equipment as in the 5-ton one has forty-four cells, 17 M. V., and its traveling radius of 7½ miles an hour is placed at 30. The 2-ton truck has a similar mileage at a 9-mile rate, while the 2,500-pound express wagon has a 35-mile zone of operation at an average speed of 9¼ miles per hour. To go still further the 1,000-pound delivery wagon at 12 miles per hour has a sphere of activity of 35 miles and the little 800-pound panel sided delivery wagon with its single motor and twenty-four cells of battery is accredited with 30 miles with 12 to the hour.

Couple-Gear With a Variety of Steering Gears

This company manufactures 1, 2 and 5-ton vehicles, the former two steered and driven through the front wheels but the 5-ton machine driven and steered through all four wheels. As the majority of Motor Age readers know, the electric motors are contained within the driving wheels, which resemble a pair of saucers placed with their concave surfaces together, the space between them carrying the electric motor. These motors in particular, which are manufactured in the company's plant, develop a speed of approximately 1,400 revolutions per minute, with the truck making six miles per hour. Giving each a rating of 3-horsepower, it makes a grand total of the four wheels in the 5-ton truck of 12-horsepower which, taken into consideration with and unconventional propositions, chiefly because of the massive appearance of the front wheels, whereas in the rear a pair of heavy buggy wheels are in position. This will be better understood when it is remembered that both the 1 and 2-ton cars have wheels similar to those used in the 5-ton truck whereas 36-inch wheels are used in the rear. The speed of the 1 and 2-ton trucks is respectively 9 and 7½ miles per hour with load. The observer cannot help but note the construction of the main frame in the 5-ton truck with its I-beam construction reinforced with oak cross members. In all three vehicles the battery is of the underslung type carried centrally between the axles in the 5-ton but closer to the front axle in the 1-ton machine.

Logan 3-Ton Truck of New Construction

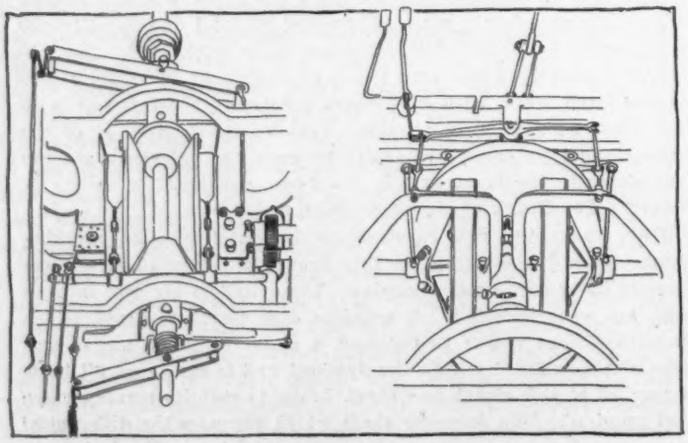
This truck is of new construction and totally unlike anything manufactured heretofore by this firm. It has a 40-horsepower four-cylinder water-cooled engine. The cylinders are cast in pairs and are waterjacketed. A multiple disk clutch is fitted, which is of sufficient power to transmit a motor of much larger size. The clutch is fitted within the flywheel and is run in an oil bath. Attached to this clutch is a check brake to stop its turning when not required. The propeller shaft which precedes the differential gearset is fitted at each end with universal joints. The jackshaft,

THE COPPOCK TWO-CYCLE TRUCK

of course, is connected by double-chain drive to the rear wheels. The stroke of the engine is 5 inches and the bore 4¾ inches. A splendid feature is the oiler, which is integral with the engine base. The pump is run by a positive drive. A tubular radiator is used besides the usual fan. The ignition is of the jump-spark pattern and the other fitments closely follow the lines of the well-designed pleasure vehicle, such as side levers and steering column control. The above is a brief analysis of a well-designed truck. This firm also manufactures a 1-ton truck, which has been described by Motor Age in an earlier issue.

Reliance an Exponent of Two-Cycle Principle

The motor vehicle has no more able exponent of two-cycle engines than the Reliance company, of Detroit, which manufactures them in three styles and sizes, one with a 30-horsepower two-cylinder motor, a three-cylinder 45-horsepower motor and a four-cylinder 60 horsepower. The two-cycle engines used in all operate on the conventional three-port principle, in which the mixture is first taken into the crankcase and bypassed through the cylinder wall to the combustion chamber, the reciprocation of the pistons covering and uncovering the intake and exhaust ports at the proper time. The Reliance people claim particular advantage for these motors because of their simplicity, being free, they point out, from valves, valve springs, camshafts and the other necessaries in connection with poppet valve actuation. In all of these the transmission is a sliding gearset, having leather-faced cone connection with the motor. The forward axle is an I-beam construction cast from vanadium nickel steel and having Timken bearings in the steering knuckles as well as for carrying the road wheels. The differential gear is carried in the rear of the transmission and the use of the jackshaft calls into operation side chain drive. Frameworks on all models are channel steel, with the channel facing outwards. In the big trucks the frame slopes gradually to the rear, a fact that greatly facilitates loading and unloading. Braking is through external bands acting on drums on the rear wheels and on the jackshaft, the bands for each set being faced with camel's hair. She respective load capacity of the machines is 2, 3 and 5 tons. The cylinders have a bore of 5⅛ inches and 5-inch stroke.



MEISELBACH AND WEEK'S GEARSETS

Worm Drive Feature in the Mitchell

The Mitchell truck, with a 1-ton capacity, has as its leading peculiarity a worm drive from the rear end of the propeller shaft to the rear axle in place of the ordinary bevel pinion and bevel gear drive invariably used in American cars. Abroad the worm drive has been used in commercial vehicles for several years by the Dennis company, and its heavy commercial cars have shown up with the greatest success. The Mitchell worm drive is not new, having been in use for a long time and having a claim made that while more expensive to manufacture it is more advantageous in many regards. The motor power plant is a four-cylinder engine of Mitchell design, mounted longitudinally in front beneath the footboard and the driver's seat. It has a rating of 20 horsepower and with a six-to-one gear ratio is capable of giving the truck a speed of 15 to 18 miles per hour. Flexible connection with the motor is through a cone clutch in the flywheel. Speed variations are through a three-speed progressive gearset, located centrally in the car. Not to be overlooked on the motor is the employment of a high-tension ignition system with a magneto as current supply and storage cells in reserve, this marking the Mitchell industrial vehicle as one of the very few to employ the magneto, which has such a large following on foreign commercial cars. The truck's running gear has brought together such important features as very heavy I-beam front axle, pressed steel frame construction, semi-elliptic spring suspension all around, together with such detailed specifications as 110-inch wheelbase, 30-inch wheels all around, with 3 and 3½-inch tires and standard tread. The truck has good carrying capacity, due to the location of the driver's seat. The load space in rear of this is 5 feet 3 inches in length, 3 feet 7 inches wides and of any desired height. Owing to the seat being carried high the driver is given a good position of observation for crowded city work. The radiator does not came as high as the footboard and is well protected, while control is through a vertical column, with large hand wheel and conventional pedal throttle elements.

Knox Has a Four-Cylinder Truck

The Knox company, which is one of the oldest truck builders in this country, is now showing a modern 3-ton truck of the four-cylinder type; also a two-cylinder 1½-ton machine. The 3-ton truck is equipped with a well-designed powerful motor of about 30 horsepower. It is an air-cooled engine and gives a very slow speed. Large 36-inch wheels are fitted with 4-inch single tires in front and 4-inch twin tires of European design in the rear. The length of the body over all is 15½ feet, with a width of about 7 feet. This is a well-made and strong truck apparently built of splendid material, and its weight is but 3,600 pounds. The rear axle is dead and of 2½-inch diameter. The front axle is I-beam and of good size. The gears are selective, with three speeds and reverse. Drive is by countershaft and side chain. A metal-to-metal brake is placed on the shaft and an emergency brake on the wheel hub. The smaller car, which is made for fast service, has a 16-20 two-cylinder vertical engine, with bore and stroke 5 by 7, respectively. This is air-cooled with the usual Knox planetary transmission, disk clutch, jump spark ignition, oil pump and compression grease cups. The wheelbase is 100 inches and wheels are 34 inches in diameter, the rear wheels being fitted with 4-inch solid tires and the front wheels with slightly smaller tires.

Safir Only Foreign Truck in the Show

This truck might be called a ball-bearing truck. Its frequent successes in European reliability trials are said to be partly due to this fact and there is no doubt some ground for the belief. Most all bearings are of the caged ball type. Also the construction generally of the car is good. Each car is equipped with a four-cylinder engine giving approximately 30 horsepower, European rating. The stroke is 5½ inches and the bore 4$\frac{5}{16}$, or its equivalent in meters. The company also has an improved car-

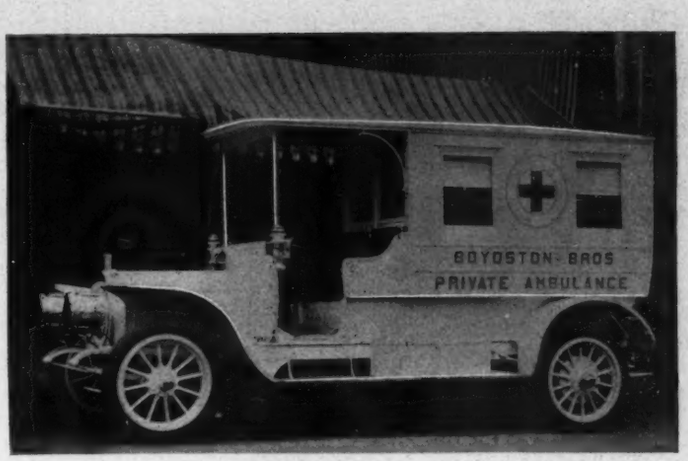
bureter of its own make, which is said to govern both the supply and mixture. The rest of the power plant consists of electric ignition of the jump-spark pattern, multiple disk clutch and a transmission gear of the selective type. The driving wheels are chain-driven and the power plant is mounted on two side members or sub-frames. Thrust bearings are used where necessary. Semi-elliptic large springs of good length are fitted to every car. The gasoline tank and reservoir for lubrication are of ample size, the gasoline tank being fitted at the rear of the car underneath the load. Extra precaution has been taken by this concern against accidents and trouble occurring by general road use, and the truck is fitted with sprags attached to the rear axle. These sprags are connected with the reverse gear in a manner which prevents the latter from being engaged. Strong aprons protect the full power plant from troubles beneath the car. Internal and countershaft brakes are fitted, in addition to the motor brake. The truck is of ample proportion, measuring 19 feet 7 inches in length and over 6 feet in width; the wheelbase is 12 feet 9 inches. Taken as a whole the truck is well designed and accessible.

Rapid One of Features of Show

Perhaps no other vehicle attracts so much attention in the armory as does the Rapid truck, which participated a week ago in the 600-mile reliability run of the Chicago Motor Club, traveling on the daily schedule of 14 miles per hour with a load of twelve passengers. Its schedule was the same as that for the class C pleasure cars, and the truck showed such wonderful speed as to beat the 14-mile an hour schedule 1 hour in a distance of 75 miles. This truck, like practically all others bearing the Rapid trademark, used a 24-horsepower opposed two-cylinder motor, with 5 by 5-inch cylinders. The motor is placed amidship, with the cylinder bores longitudinally. On the crankshaft continuation is carried the two-speed and reverse planetary gearset. Drive is by single chain to a jackshaft, carried well in front of the rear axle, and from this by side chain to the rear wheel sprockets. This design is practically the same as used by the company a season or two and has proven itself a most capable one for light and rapid work, such as required in observation cars, stages, ambulances and delivery wagons up to 1½-ton capacity. The same chassis is used in all except for such detailed changes as differences in wheelbase and spring arrangement. A commendable spring suspension used consists of a platform support in front with a transverse member at the rear of the side spring pieces. In the rear also is a platform suspension with a cross member clipped beneath the back transverse part of the spring. Additional aid is provided in the form of a transverse semi-elliptic above the rear axle. Points not to be overlooked in the running gear are gear and sector steering mechanism, angle frame pieces, rear wheel brakes and wheelbases ranging from 86 to 90 inches. The Rapid motor differs from many two-cylinder opposed engines in that the valves are removable through caps threaded into the face of the valve chamber next to the crankcase and not through the outer face of the valve chamber. This construction makes it possible to have a continuous water surface over the cylinder head and valve chamber head. In other respects the motor is conventional and is carried upon dropped pieces of the frame. It has jump-spark ignition, mechanical lubrication, float feed carburation and pump water circulation.

American Trucks in 3 and 5-Ton Styles

The 3 and 5-ton trucks manufactured by the American Motor Truck Co., Rockford, N. Y., are fitted with a slow-speed four-cycle four-cylinder gasoline motor, the speed of which is largely cared for by a governor acting on the throttle valve. In both trucks the motor position is a longitudinal one under the footboard and seat. Transmission from the motor is through a planetary type, with its axis in the line of the driveshaft and thence by shaft to a differential jackshaft in front of the rear axle. From this shaft side chains transmit power to the rear wheels. High speed in the planetary gearset is by a disk clutch operating in oil. In the running gear field the American trucks are worthy of notice with their stout I-beam front axles and equally stout

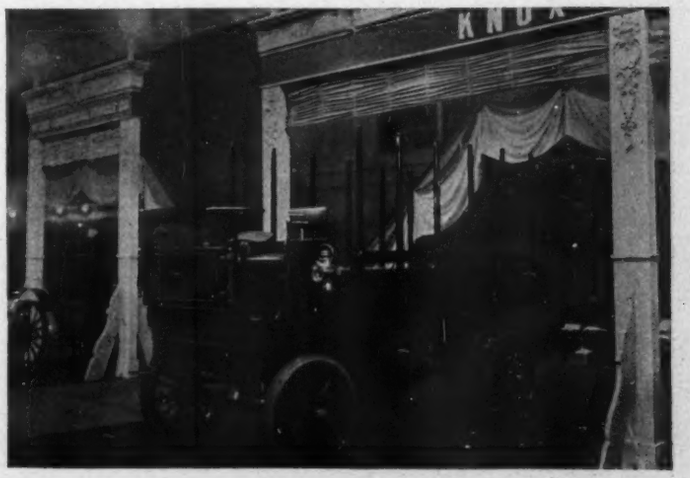


ROYAL TOURIST AS AN AMBULANCE

real axles of square cross section, both fitted with Timken rollers for the road wheels. On the 36-inch wheels are single front tires and twin rears. Channel steel members of the frame are hot riveted; semi-elliptics in front and a platform system in the rear support the framework on the axle; and there are two brakes located on the jackshaft as well as two on the rear wheels, which, together with two drag bars to prevent the truck slipping backwards on a grade, compose a good safety factor. In connection with the motor it might be noted that a conventional float feed carbureter is used, igniting current coming from storage and dry cells; cooling is by positive water system and lubrication by force feed, with a splash in the crankcase.

Alden Sampson's Motor Train

This train, not exhibited, consists of a tractor and two trailers, each independently driven by electric motors. Each unit runs on six wheels, the middle pair being the drivers, and considerably larger than the end pairs. Steering is by four wheels on each car, the front and rear pairs being interconnected and a special tongue provided for attaching to the tractor or car ahead so that in rounding turns the wheels of the whole train will track. The drive wheels are 54 inches in diameter and carry half the gross load, while the steering wheels which divide the remaining half betwen the two pairs are 42 inches in size. All are shod with iron tires. The tractor and cars can be run in either direction equally well, the two ends of the trailers being identical, so that they can be connected up from either end like a railroad freight car. The tractor, which can be handled by one man, carries an independent power plant. A four-cylinder Buffalo gasoline engine extending under the rear of the hood and footboards drives through a silent chain to a large electric generator directly in front of it at the front end of the hood. The power plant and radiator are carried on a separate frame supported on the main frame by a special form of spring suspension that relieves the plant of excessive shocks and from damage due to twisting.



KNOX EXHIBIT OF INDUSTRIAL CARS

THE most comprehensive display of component parts, fittings and supplies made at any show this season is spread most attractively before the eyes of the visitor to the Chicago show this week. The exhibits completely fill the gallery of the Coliseum, the second floor of the annex, parts of the first floor and basement of the annex and the gallery of the First regiment armory. In general they are well arranged, the spaces are of comfortable size and the goods shown are interesting. There are many new devices in a diversity of lines. There are also a good many new names of exhibitors on the signs over the stands. In the following pages Motor Age mentions briefly and illustrates some of the new products.

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Pure silk puncture-proof tire fabric is a decided novelty shown by the Zeglen Bullet-Proof Cloth Co., of Chicago. The fabric is made in two thicknesses—seven-ply and nine-ply—and in strips ready to be covered with rubber and vulcanized. This fabric is not only puncture-proof, but it is said it will resist the impact of rifle bullets, for which purpose it was originally produced. A bullet-proof vest made of it is shown in the company's stand. Convincing evidence of its effectiveness is presented in several sections of tires into which 38-caliber lead bullets have been fired from a distance of 10 feet while the tire shoe was held against a pine board. The bullets are merely embedded in the rubber without having penetrated the fabric. The fabric is extremely pliable and does not reduce the resiliency of the tires in which it is used, and as the material is silk there is less internal friction than in cotton, it is said. Necessarily, the cost of tires made with it is high, but the life of the fabric is long, it is pointed out. At present the Zeglen company is making the fabric only, but expects later on to manufacture the tires complete.

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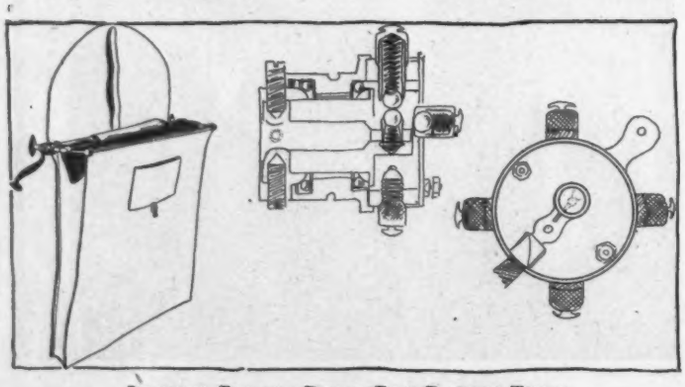
Drop forged I-beam front axles, square solid rear axles, crankshafts, connecting rods and smaller parts, all in the rough, malleable steel flywheel castings and gear blanks, and gray iron cylinder castings are displayed by the Western Malleable Steel Co., of Detroit. These component parts are produced upon order for manufacturers. A specialty is made of producing castings that are homogeneous, tough, true to pattern and easy to machine.

A cast steel differential housing of globular form machined and polished outside is a leading feature of the display of parts made by the Whiteley Steel Co., of Muncie, Ind. Other specimen castings from Whiteley's Crown steel are exhaust manifolds, pedals, connecting rods and flywheels. The peculiarity of the metal from which these are made is its density, uniformity and homogeneous character and its superior flowing qualities. Castings made from it are exceptionally smooth and free from air holes and pitting. The metal has a strength of 68,000 to 74,000 pounds to the square inch.



IMPERIAL BAG AND BEMUS BALL-BEARING TIMER

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Tops in three styles for single and double-seated cars are shown by the Auto Accessories Mfg. Co., of Detroit. These are of the folding variety and are covered with waterproofed fabric. Many samples of top coverings are also displayed, including real leather, pantasote, duck and waterproofed material.

* * *

Voltz, Schildback and Beecher wind shields are the products of the Limousine Carriage Mfg. Co., of Chicago, samples of which are exhibited. Strength, simplicity and practicability are the qualities which the makers have sought to secure. The Beecher shield has semi-circular slotted brackets and hand wheels by means of which the upper half can be held at any desired angle. No hinges are used on the Schildback, whose upper portion is held on the lower half by tapered pins resting in sockets and prevented from rocking by brace rods whose ends slide on the braces for the lower section. The Voltz is a brass-bound shield having dovetail keys and sockets and requiring no upper supporting rods.

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The Studebaker Brothers Mfg. Co., of South Bend, Ind., also displays several styles of divided shield, called the Studebaker sliding and Studebaker folding front. They are easily adjusted, simple and strong. Set screws hold the upper half of the folding front in position when raised. Both styles are made with brass or solid wood frames.

* * *

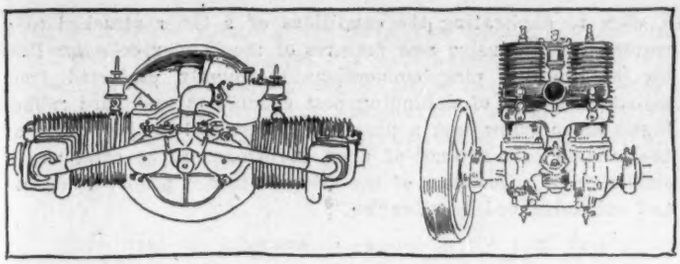
The only spring wheels at the show are found in the space of the Nelson Wheel Co., of Chicago., which displays two mounted on a complete front axle. Twenty-one broad steel rings, all bound together in the same plane and attached at the center of the group to the hub and at the periphery to the wheel rim, take the place of the customary radial wood spokes. These contribute resiliency and offer great resistance to lateral stresses.

* * *

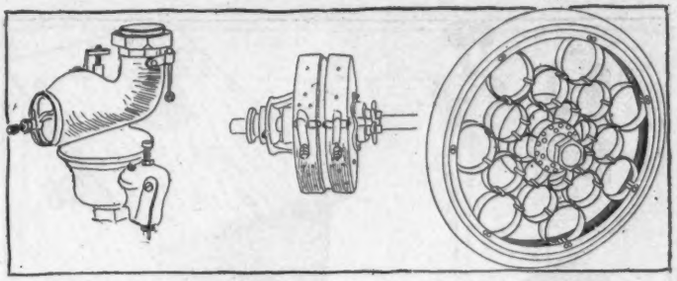
Spiral flange tube radiators in seven styles are shown by the Long Mfg. Co., of Chicago, which also exhibits hoods, dashes and fenders of pressed steel. The latest addition to the line is the new flat tube honeycomb radiator in which the tubes are vertical and have lateral cooling flanges.

* * *

The new Reliable jack, Reliable compound hand tire pump and Fry adjustable spark plug are exhibited in the stand of the Elite Mfg. Co., of Ashland, O., a new exhibitor. The jack is made in two sizes, one for cars weighing up to 4,000 pounds and the other for cars up to 8,000 pounds. It is of malleable iron with a screw of special steel. The screw is raised by a bevel gear with internal thread which is rotated by a bevel gear and



AUTO PARTS CO.'S MOTOR AND TEG ENGINE



HEITGER CARBURETER, MURRAY PLANETARY, NELSON WHEEL

ratchet handle. The jack is self-locking in any position. The Fry plug is unique in having an electrode that is adjustable by a thumb nut at the outer end. Thus the spark gap can be increased or diminished according to the strength of the current and other conditions.

* * *

The Dolly Trouble Hunter is the fantastic name given to a small incandescent hand lamp which is connected by insulated wires to dry battery cells and used for inspecting the machinery of a motor car in the dark. It is seen in the exhibit of the Stackpole Battery Co., of St. Mary's, Pa., whose principal display consists of Stackpole dry cells.

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A new timer that has been run 5,000 miles and the feature of which is that it can be used with either a vibrating or non-vibrating coil is a new product of the Motsinger Device Mfg. Co. The rotating part has a spring-actuated snap contact piece that moves over studs in the case and breaks contact suddenly. The parts are adjustable to take up wear.

* * *

Besides the Duro storage batteries for ignition purposes, the Chicago Battery Co. exhibits a new battery called the Motor, which is made solid electrolyte for ignition purposes and with liquid electrolyte for lighting purposes. The company also has just added to its extensive line of side and tail lamps, an acetylene headlight and an electric headlight, both of attractive appearance.

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Zoar storage batteries for ignition and lighting purposes have been manufactured for nearly a year by the Zoar Storage Battery Co., of Zoar, O., but are now exhibited at a show for the first time. Samples in five sizes are displayed. The positive plates are formed chemically, which, it is claimed, contributes to longevity. Very heavy terminals that are proof against sulphating are attached to the elements, which are sealed in hard rubber jars enclosed in a hardwood case.

* * *

Fire Fly spark plugs made and shown by the Auto Specialists Mfg. Co., of Milwaukee, embody some new ideas. Chief of these is a combustion chamber in which the gases are confined and exploded, with the result, it is claimed, of cleaning the spark points and preventing short-circuiting. The positive pole is a Meteor wire point while the negative pole is threaded.

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Several styles of folding shields are also exhibited by the Chicago Wind Shield Co. Some fold inside and others forward, and some are framed in brass and others in wood with cherry mahogany finish.

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Spur gear planetary transmissions capable of transmitting power up to 50 horsepower are shown by W. B. Murray, who also shows one model of three-speed selective sliding gear, one contracting band clutch and a new equalizing gear with bronze bushed spur gears. Characteristics of the planetary transmissions are that the pinions remain in place when the center driving gear is removed and an internal expanding clutch that excludes dirt, is adjustable from the outside and has no end thrust. The cases are made in one piece cast from gray iron. Although Mr. Murray has been manufacturing transmissions for the last 6 years, this is the first time he has exhibited at a show.

* * *

There is an interesting demonstration of a force feed oiler working against a pressure of from 500 to 600 pounds at the stand of Edward Neely & Co., of Chicago. The pressure is indicated by the large air gauge. The action of the oiler, which has eight feeds, is seen through a glass front. Samples of smaller Neely mechanical lubricators are also shown.

* * *

The Central Rubber Co., of Chicago, is a new exhibitor which shows in the armory a fine line of rubberized silk coats, men's cravenetted winter coats, lap robes, rubber lamp covers, rubber matting, and tires and tire appliances. This company manufactures everything in soft and hard rubber except combs.

* * *

Double opposed motors, both water and air-cooled, planetary transmission for powers up to 80 horse, and radiators comprise the products shown by the Auto Parts Co., of Chicago, which has just gone into the general supply business.

* * *

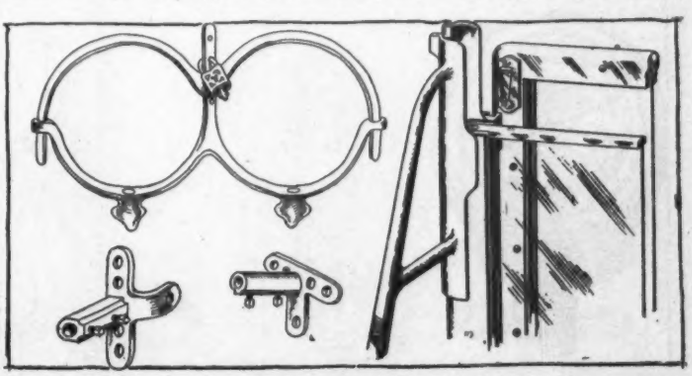
The newest engine which it makes is a duplicate of the Holsman opposed air-cooled motor. The company handles all parts for buggy type cars, including ball bearing square axles.

* * *

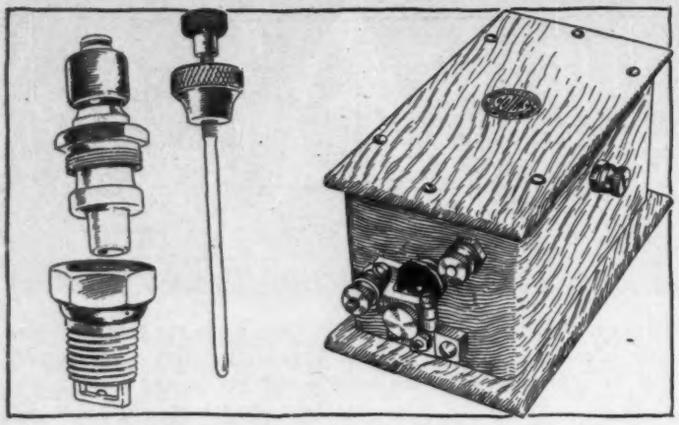
A pressed steel frame, hot riveted, and channel section cross members constitute the display of R. B. McMullen, Chicago selling agent.

* * *

A twin cylinder two-cycle air-cooled motor is shown in operation utilizing compressed air by the Lange-Smith Motor Co., of Chicago. This is called the Teg motor and has an internal cooling system together with the customary external flanges. The compressed gas is fed to the cylinder through the piston, which is made with cooling flanges in the port. The engine weighs 175



GILBERT TIRE LOCKS AND VOLTZ WIND SHIELD



FRY SPARK PLUG AND PFANSTEIL COIL

pounds and develops 16 horsepower. The company also manufactures a 30-horsepower double-cylinder and 8 and 15-horsepower single-cylinder engines and will soon have ready for the market 45 and 60-horsepower models.

* * *

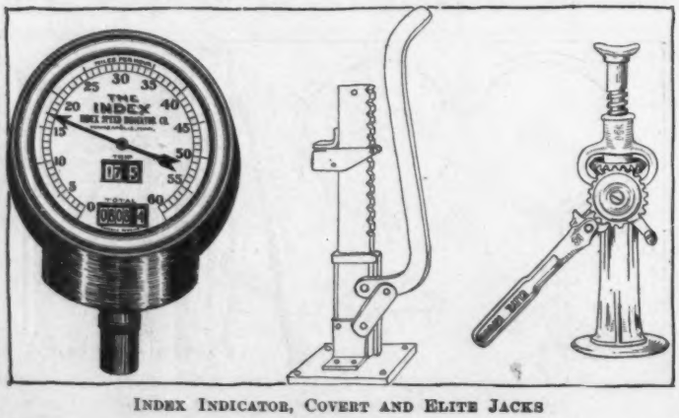
Three styles of folding tops are exhibited by the Longdin-Brugger Co., of Fond du Lac, Wis. One style is for a two-passenger runabout and the others for side entrance touring cars, one being provided with front curtain and celluloid window. The cover material employed is macintosh cloth in black. The bows are selected second growth ash reinforced by strips of half-oval iron. The joints and body irons are hand-forged and fasteners are of solid brass. This same company also makes folding tops for motor boats although none is on exhibition.

* * *

The display of the Vivax Storage Battery Co., Chicago, includes primary batteries for ignition and lighting purposes and also one thirty-cell vehicle battery. The small batteries are shown connected with sparking plugs, small electric motors and lamps all in operation, and at the back of the stand is a pyramid of these batteries. On a panel are shown the components of the vehicle battery, including girds, negative plates, separators and connections. The grids and plates are made by the company and the active material is locked in and so housed that no particles can become detached from the plates and fall to the bottom. The elements are connected by spark straps and submerged in an electrolyte made of pure acid. Over each jar or cell of the ignition battery is molded a hard rubber cover provided with a vent.

* * *

A special demonstrating machine is used at the stand of the Duplex Coil Co., of Fond du Lac, Wis., to test the speed of Duplex coils, their current consumption and intensity of spark. This machine is operated by electrical power, carrying a timer and a speed indicator. The power is transmitted and indicated by means of friction disks, capable of a variety of speeds with



INDEX INDICATOR, COVERT AND ELITE JACKS

a view to duplicating the conditions of a timer attached to a motor car. Exclusive new features of the Duplex coils for 1908 are high-tension plug connections thoroughly protected from moisture instead of a binding post connection and hard rubber high-tension screw cap; a plug switch fastened to the bottom of the outside case instead of upon the front of the case, and a simple single adjustment of the vibrator that is positive, delicate and not influenced by vibration.

* * *

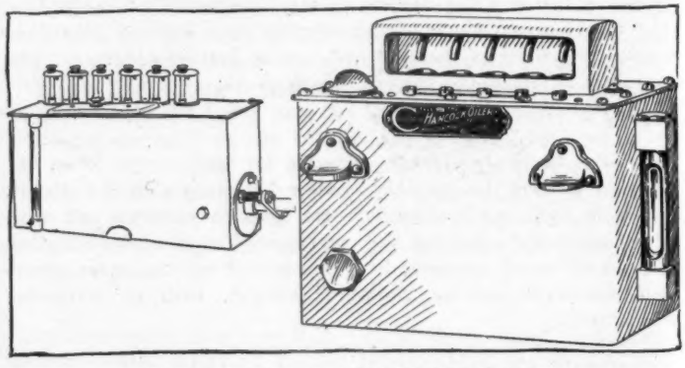
Two wind shields are displayed by Cartier, Chapman & Co., one with brass frame and the other framed in wood.

* * *

A semi-elliptic and a platform spring with scroll and coil springs attached are mounted on a frame and connected with levers so that the action of the springs can be demonstrated, at the stand of the Triple Action Spring Co., of Chicago. The object of the scroll and coil is to absorb the light shocks that are not taken up by the elliptic leaf springs, to the ends of which they are applied. Coil springs with scrolls attached are shown separately to be attached to the regular type of leaf spring. Side motion is prevented by an ingenious construction of the scroll eyes.

* * *

Caterpillar spark coils in units from 1 to 6 are exhibited by the Pfanstiehl Electrical Laboratory, of North Chicago. The



NEELY LUBRICATOR AND HANCOCK OILER

prominent feature of the display is an automobile unit that is claimed to be the largest ever constructed. It has the power of a large X-ray coil and could be converted into such a coil very readily. This is operated with 110 volts direct current, giving a discharge which is called the Caterpillar flame and shows the same quality of discharge as the units of regular size. The regular coils are shown in operation with Vivax batteries and Maximus distributor.

* * *

In addition to the well-known Never-Miss porcelain and mica spark plugs, the Never-Miss Spark Plug Co., of Lansing, has on exhibition as the latest additions to its line an ammeter, a volt meter and a volt ammeter. These instruments are constructed from superior materials and the coils are wound on brass spools carefully insulated. The pivot carrying the indicating needle is made from stub steel hardened and finished by a special process. The latest addition to the spark plug line is the Takedown plug, which is readily separable by hand and can, of course, be reassembled without tools.

* * *

An interesting new constricting band clutch is shown by the Warner Clutch Co., Chicago. Within the cast steel housing is a clutch drum with a keyway for keying to the shaft. Crucible steel bands surround this drum and bear against adjusting blocks in the housing. The other end of each band is in contact with one end of a pair of toggle arms. These toggle arms are straight-

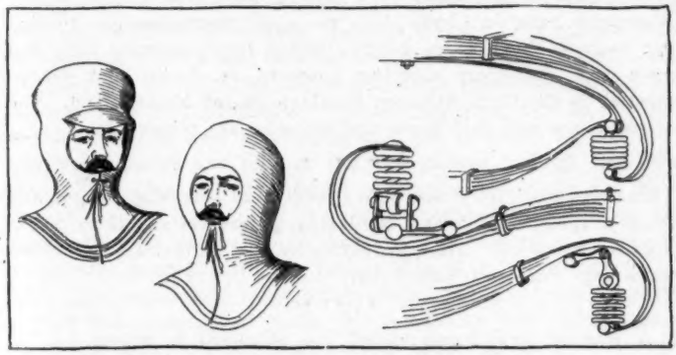
ened to bind the bands by means of two rotating screws with quick pitch threads. A cross arm with keyways in the ends is forced inward on these screws by means of a pedal, thereby rotating them to set the clutch. Release is by means of a spring. The drum and bands are especially hardened and as they are lubricated there is very little wear.

* * *

A good deal of information regarding the manufacture of varnishes for motor car uses can be obtained from the very agreeable attendant at the stand of the Standard Varnish Co., of New York and Chicago, in the gallery of the First regiment armory. Here are displayed samples of various crude gums used in the production of varnishes. These gums come from such remote places as the Island of Java, Siam and Singapore, from Zanzibar, New Zealand, Dutch East Indies, north Africa and the interior of China. They are all from extinct trees such as pine and juniper. They are found in only limited quantities and the price is constantly rising. Besides these samples, the Standard company also shows samples of the various finished products in glass tubes in which the difference in colors can be observed. Although many varnishes are made by blending the oils from the different gums, those used for motor car work are each from one gum only.

* * *

One of the most extensive lines of accessories and supplies displayed at the show is found in the booth of the Franco-American Auto and Supply Co., of Chicago. This includes, among other



THE VISOR HOOD AND TRIPLE ACTION SPRINGS

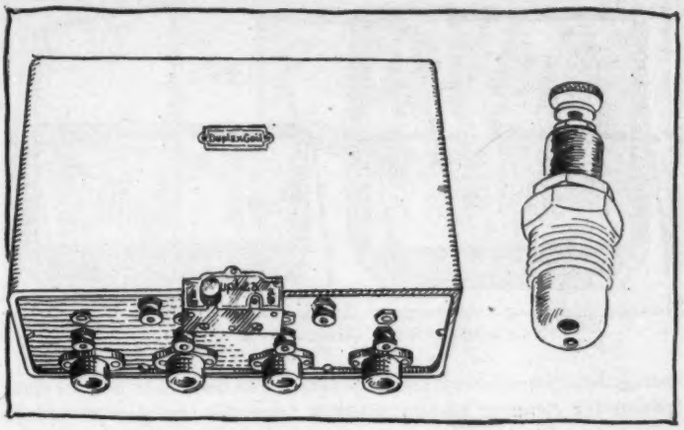
goods, Lacoste, Pittsfield and Kingston coils, Lacoste magnetos, Solar, Gray & Davis, Saxon and Edmunds & Jones lamps, Amco bumpers, Beaver two-cylinder motors, Bullard wrenches and Herz, Splitdorf and Bemus timers. New additions to the line to which special attention is being drawn are the genuine Euclair pump connection, Bell pressure pumps, Franco metal polish, and the Stereo-Light gas tank, which is just one-half the size of the tanks formerly on the market and the sale of which is controlled throughout the middle west by the Franco-American Auto and Supply Co., of Chicago.

* * *

Owing to delay of shipment by express, the Heigter Carbureter Co., of Indianapolis, was unable to show its new Heigter carbureter up to the close of the show on Monday, but had on display the Amco bumper and Amco tire holders. A number of improvements have been made in the carbureter for 1908 which make it more reliable, neat and compact.

* * *

There are a number of new additions to the extensive line of motor cycle oil pump having a celluloid barrel and hand plunger, motorcycle oil pump having a celluloid barrel and hand plunger, priming cocks in eleven kinds, a centrifugal gasoline strainer, soldered and solderless pipe fittings, and an apparel holder made to be secured to the coat rack of a tonneau. The Imperial line also includes oil pumps with celluloid and glass barrels and centrifugal and geared water pumps. The gasoline strainer has



DUPLEX COIL AND FIREFLY SPARK PLUG

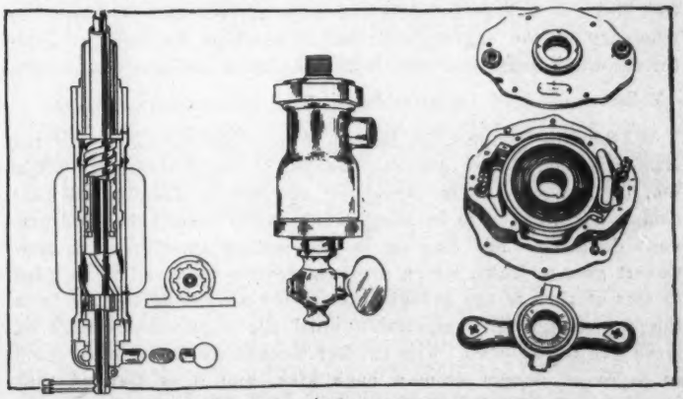
the brass cylinder slightly flared out at the lower end and formed with a series of four wings or lugs extending inwardly from the body of the shell. In operation the gasoline enters the strainer at the side and striking an inner tube is deflected downward and outward in a centrifugal manner against the lugs, thereby separating all the water from the gasoline and discharging dirt or refuse, which remain at the bottom where they can easily be drawn off through the pitcock. The discharge of gasoline is through the screened central tube and out of the top of the strainer. This strainer acts much on the principle of a cream separator or honey extractor.

* * *

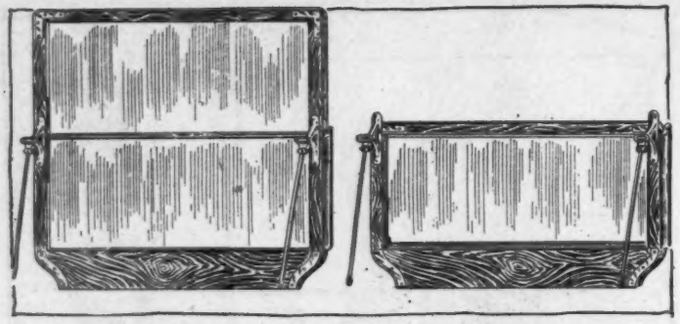
A newcomer in the components field is the Ross Gear and Tool Co., of Lafayette, Ind. This company has been in business about 1 year, but has never before exhibited at a show. Its line consists of bevel gears, bevel gear differentials, complete steering gears and universal joints. Samples of these parts which are displayed show careful design and good workmanship. Four types of steering gears are shown. One of these is called the tubular steering gear. It has large contact surfaces which reduce wear to a minimum and are so constructed that there is no wear in mid position and so that the gear will not bind in the extreme position if the wear is taken up. This gear is built for truck and touring car uses in which back lock should be absolute. The steering arm has sidewise motion and the internal controls are operated in a notched sector on top of the wheel.

* * *

The most extensive line of sundries in the show is spread in a pleasing array in the large booth of the Excelsior Supply Co., of Chicago, in the orchestra stand on the balcony of the armory. It would be difficult to discover anything in the motor car fittings and supply line that is not carried by this house and exhibited at the stand. A space at one end is given over exclusively to the display of Continental Caoutchouc tires. The latest addition to the line and a distinct new device is the Triumph valve lifter, which weighs only 6 ounces and folds flat. This is



ROSS TOOL, IMPERIAL STRAINER, WARNER CLUTCH



CHICAGO WIND SHIELD CO.'S WARES

being demonstrated by an attendant. Car-Bo-Nit is a new compound for cleaning carbon deposits from the inside of cylinders and from pistons. It is a harmless preparation of glycerine and alcohol that softens the carbon if some of the solution is allowed to stand over night in the engine. It is also used for cleaning spark plugs. The Excelsior company is now handling the preparation.

* * *

The DeSouchet motor starter is a brand-new device for starting the engine of a car from the seat. It is made and exhibited by the DeSouchet Motor Appliance Co., of Chicago. It consists of a round metal drum having an internal ratchet mechanism and a long hand lever. On side crank cars the drum is attached to the end of the crankshaft and the lever rises at the side of the seat. In starting, the device acts like a ratchet wrench to turn the motor while standing. It is designed to have great leverage, so that one downward pressure of the handle will suffice to do the work.

* * *

The Supplementary Spiral Spring Co., of St. Louis, which is showing samples of its springs, makes the announcement that it has just opened a Chicago office with Page & Palmer, 712 Michigan avenue.

* * *

The Star power pump for garage and repair shop use is given particular prominence as a new addition to the large line of accessories handled by Eugene Arnstein, of Chicago, who has the exclusive selling agency. These pumps are made in single and double cylinder forms. Arnstein's folding screen is another novelty. It is locked in folded position by the same screws which hold it in position when raised, these screws having large milled heads. Other new specialties of the line are the H. P. ignition plug, a round double generator of the Solar type, and an exclusive line of lamps of the Century brand made in new patterns for the coming season.

* * *

Fluff-Foe is a preparation compounded by John Callahan & Co., of Chicago, for the purpose of preventing fluff, scale and rust formation in the radiator and waterjacket. It is shown in the annex. The claim is made that by keeping the circulating system clean it makes the radiation more perfect and increases the efficiency of the engine, and that it contains no acids or deleterious ingredients that can injure the most delicate mechanism.

* * *

W. Smalley Daniels, of Boston, who is selling agent for the Bemus timers, is also general manager of the Elastic Tire Filler Co., of Boston, and is exhibiting samples of Elastic tire-filler compound intended to be pumped into leaky inner tubes and prevent defiation. Mr. Daniels is also selling agent for the new Covert garage jacks, which are new devices intended to be used in sets of four in the garage to raise the weight of the car from the engine against compression until the imprisoned charge of fresh gas is exploded. The ratchet mechanism is so constructed as to avoid danger from a back kick, and it is claimed that one forward movement of the lever is sufficient to start the engine. It entirely eliminates the possibility of bruised or broken arms often occasioned by the sudden flying back of the starting crank, due to preignition of the charge. The new starter is made in two styles, one with an automatic power pump attachment for inflating tires. Other styles are soon to be brought out for attachment to two, four and six-cylinder machines that start from the front of the car.

* * *

A new magneto called the McCord is shown in operation in the stand of McCord & Co., of Chicago, in the Coliseum gallery. The magneto is contained in a brass cylinder about 4½ inches in diameter and 7 inches long that protects it against dirt and water. The armature is driven by a belt pulley at one end, and the current wire passes out from the center of the other end to the distributer.

* * *

A knit wool driving hood that is convertible into a muffler and protector for the chest is exhibited by the Visor Knitting Co., of Niagara Falls, N. Y. It is made with an opening for the face or neck, according to the way it is worn, and is made so elastic that it can be worn over a cap, fitting smoothly over the visor.

* * *

The Vesco folding top for side-entrance car is displayed by the Vehicle Top and Supply Co., of St. Louis, which also shows samples of the various cover materials employed by it in the manufacture of its tops.

* * *

A special folding body that can be transformed from a two-passenger runabout body into an open four-passenger touring car body, a closed coupe body, a closed four-passenger body and even into stationary sleeping quarters, is shown and demonstrated by the C. H. Stratton Carriage Co., of Muncie, Ind. The top and rear seat fold down and the sides are removable.

* * *

Phoebus stationary and swivel acetylene searchlights, gas and oil headlights, oil side and tail lamps, generators and lamp brackets are shown in a variety of styles by the Manhattan Screw and Stamping Works, of New York.

* * *

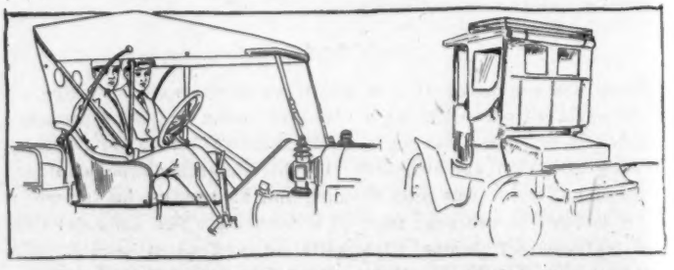
A line of new lamps called the Standard is shown by the Standard Lamp Mfg. Co., of Chicago, with a factory at Charlotte, Mich. The styles include several acetylene headlights, searchlight and gas tail lamp, oil side and tail lamps and electric searchlight, headlight, side lights and tail lamps.

* * *

A new ball-bearing timer that is guaranteed for 60,000 miles is shown by the T. Alton Bemus Co., of Boston. The special feature of this instrument is that the contact is made by two balls, the rotating member carrying a ball that rolls over similar balls in the stationary contacts. All of these steel balls are backed by spiral springs. The rotating member also runs on ball bearings and has an end thrust ball bearing.

* * *

An interesting novelty in the form of a toilet cabinet for limousine cars is the latest addition to the line of goods manufactured by C. Cowles & Co., of New Haven, Conn. This is made in two sizes, the larger having a drop door. This cabinet



AUTO ACCESSORY CO.'S TOP AND STRATTON FOLDING BODY

contains in a very compact arrangement a comb, hair brush, clothes brush, powder box, small tin sink, whisky flask, spoon and medicine glass. On the top is a small clock, card cases and medicine holders. Other Cowles' products on exhibition are annunciators, roof lamps and side lamps, and a new limousine door lock that can be applied to any door handle. The tumblers surround the knob and are turned by a key that is inserted in the knob.

* * *

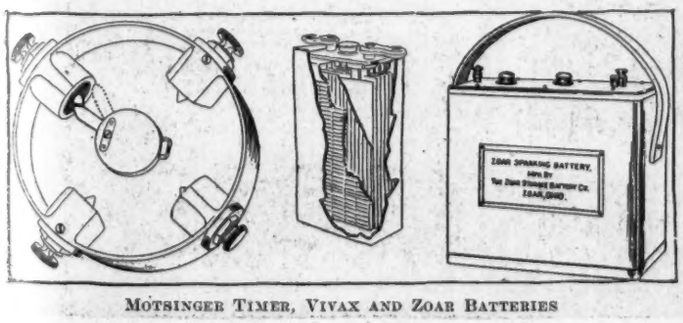
Two new specialties made by the Norwall Mfg. Co., of Chicago, are shown by the McCanna Mfg. Co. They are a four-tone motor chime and a fuel strainer. The former is blown by exhaust from the engine and is accompanied by a small pedal and cut-out valve. The chime is made from 2½-inch brass tubing 14 inches in length, and has four compartments, giving harmoniously blended tones. The valve is of double-opposed butterfly type made from materials that will not be affected by the heat. It is made in sizes to fit standard iron exhaust pipes of 1½, 2 and 3-inch diameter. The gasoline strainer is cast in one piece from bronze and has a strainer of fine wire mesh cloth and cotton gauze, both of which can be removed and cleaned readily. The liquid is strained upward so that all dirt falls to the bottom instead of being deposited upon the strainer. A special cleaning device with thumb-lock nut is placed underneath the sediment chamber, so that the strainer can be cleaned without disconnecting it.

* * *

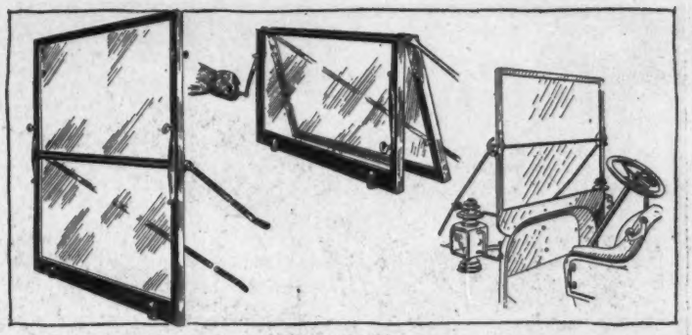
A quick method of repairing punctures in inner tubes is made possible by the Cinch tire-repair kit shown by the Auto Goods Co., of Boston. The method involves the use of a special form of collapsible metal seal that has two small metal disks connected together by a central tubular stem. The inner surfaces of the seals are coated with rubber. When a puncture is to be repaired a smooth round hole is made around the puncture by a special cutting tool and one disk of the seal pushed through the hole. By means of a pair of special pliers the two disks are then forced tightly down upon the surface of the tube around the hole, the stem of the seal collapsing and holding the disks in such close contact with the rubber that there is no leakage of air. The repair kits as sold include a full set of the tools required and a supply of seals. No cement or vulcanizing means is employed, and a puncture can be closed permanently in one minute. The repair will outlast the tube, it is claimed. The tools are packed in a flexible leather case.

* * *

A special feature of the Radium storage battery for ignition purposes, which is shown by the General Accumulator and Battery Co., of Milwaukee, is the Radium charge indicator, which renders voltmeter readings unnecessary. The charge indicator resembles in form a small grease cup and screws into the top of the battery jar. It contains a small glass tube with short scale at one side reading from 20 to 80, and an indicating column whose fluctuations can be read through the glass shell of the device. Like a barometer, this indicates at all times the changes in the condition of the battery and ignition system, so that the user need never be caught out on a lonely road with an exhausted battery. The Radium battery is filled with liquid acid that circulates freely throughout the jar, and is fitted with



MOTSINGER TIMER, VIVAX AND ZOAR BATTERIES



WIND SHIELD IDEAS, INCLUDING STUDEBAKER'S

a tight-fitting vulcanite cover with a gasket-packet joint that prevents leaking. Slopping is prevented by the use of patented gas vents. The General Accumulator and Battery Co. is also exhibiting the Decarbonizer, which is a preparation of oily substances mixed with chemicals that will combine with the carbon deposit on cylinder walls and piston and, with the aid of the combustion in the cylinder, will volatilize them, thus cleaning the cylinder and passing off through the exhaust. It leaves the engine clean and perfectly lubricated. Fifteen minutes suffices for the operation.

* * *

Combat igniters, shown by the Commercial Battery Co., of Chicago, are small storage batteries for ignition purposes. The elements are contained in vulcanite jars enclosed in a wood case fitted with wire handle. They are carefully sealed to prevent leakage and provided with gas vents.

* * *

The Connecticut Telephone and Electric Co.'s new double ball-bearing roller timer has a roller of V section. A new type of distributer and a new magneto switch manufactured by this company also are seen. The latter is intended for use on coils where the double-ignition system is used. It has a plug cutout, and is arranged so that the current indicator can be used for adjusting the coil by plugging into the switch. A further Connecticut novelty is an exploding lamp mounted on a handle and having a plug at the end of a flexible cord, so that the lamp can be connected to the batteries by inserting the plug into the switch. The Connecticut coils show no noticeable change, save in the adoption of a dial-adjusting screw, whose head is so graduated that it is possible to adjust the coil fairly accurately without the use of a current indicator.

* * *

William C. Robinson & Sons Co., in business since 1832, has only recently entered the field of motor car lubrication. It makes several grades of motor oils for different conditions. A special feature of the exhibit is a device for showing the fluidity of its oils.

* * *

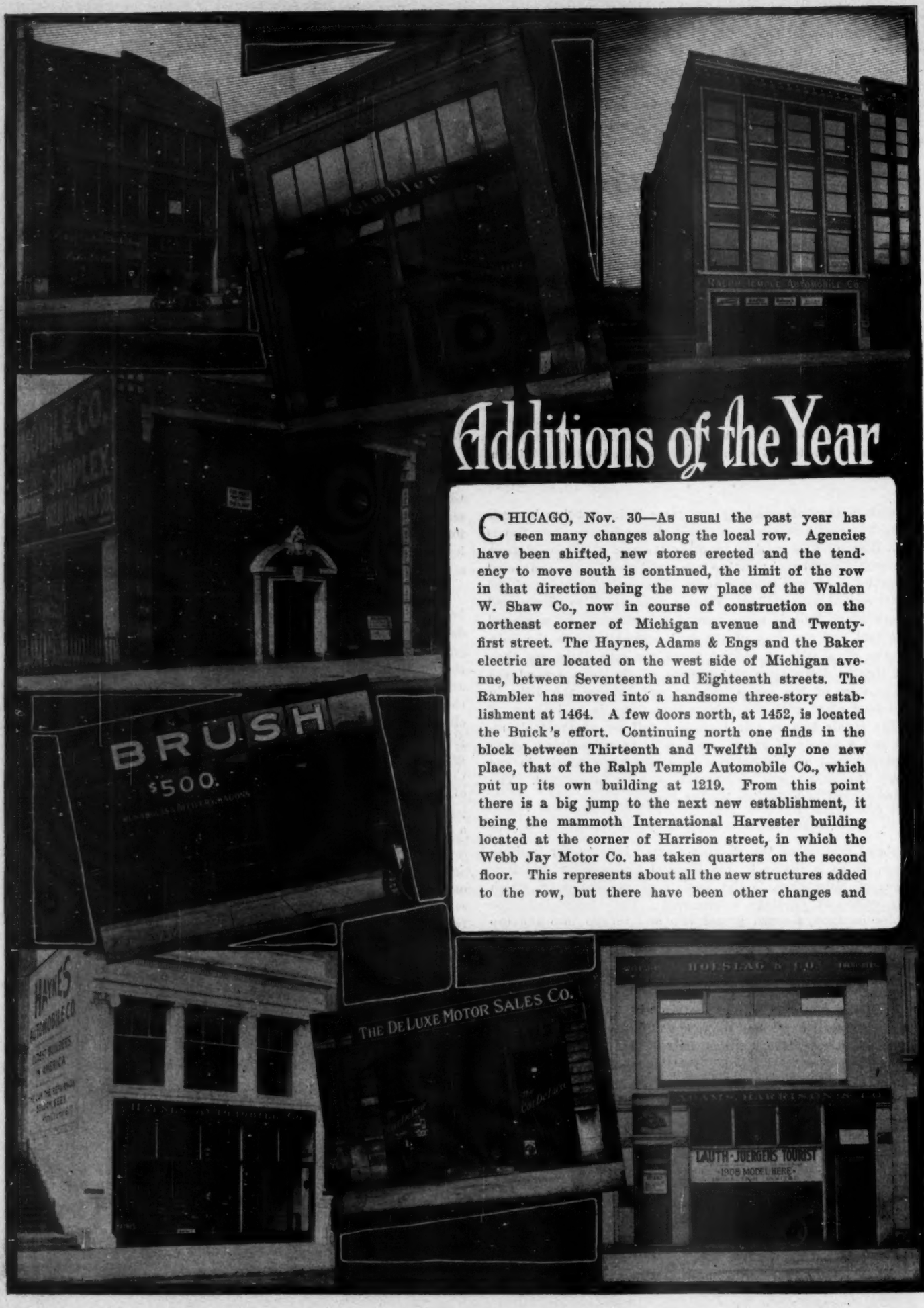
In the exhibit of the Joseph Dixon Crucible Co. is featured a transmission gearset filled with Dixon gear compound, operated by an electric motor, so that the action of the lubricating substance can be seen through the glass cover of the gear box.

* * *

Decidedly interesting is the exhibits of the New York and New Jersey Lubricants Co., maker of the Original non-fluid oils. A feature of the exhibit of the A. W. Harris Oil Co., of Providence, R. I., is a revolving tube rack which shows the comparative fluidity of the different grades of oil.

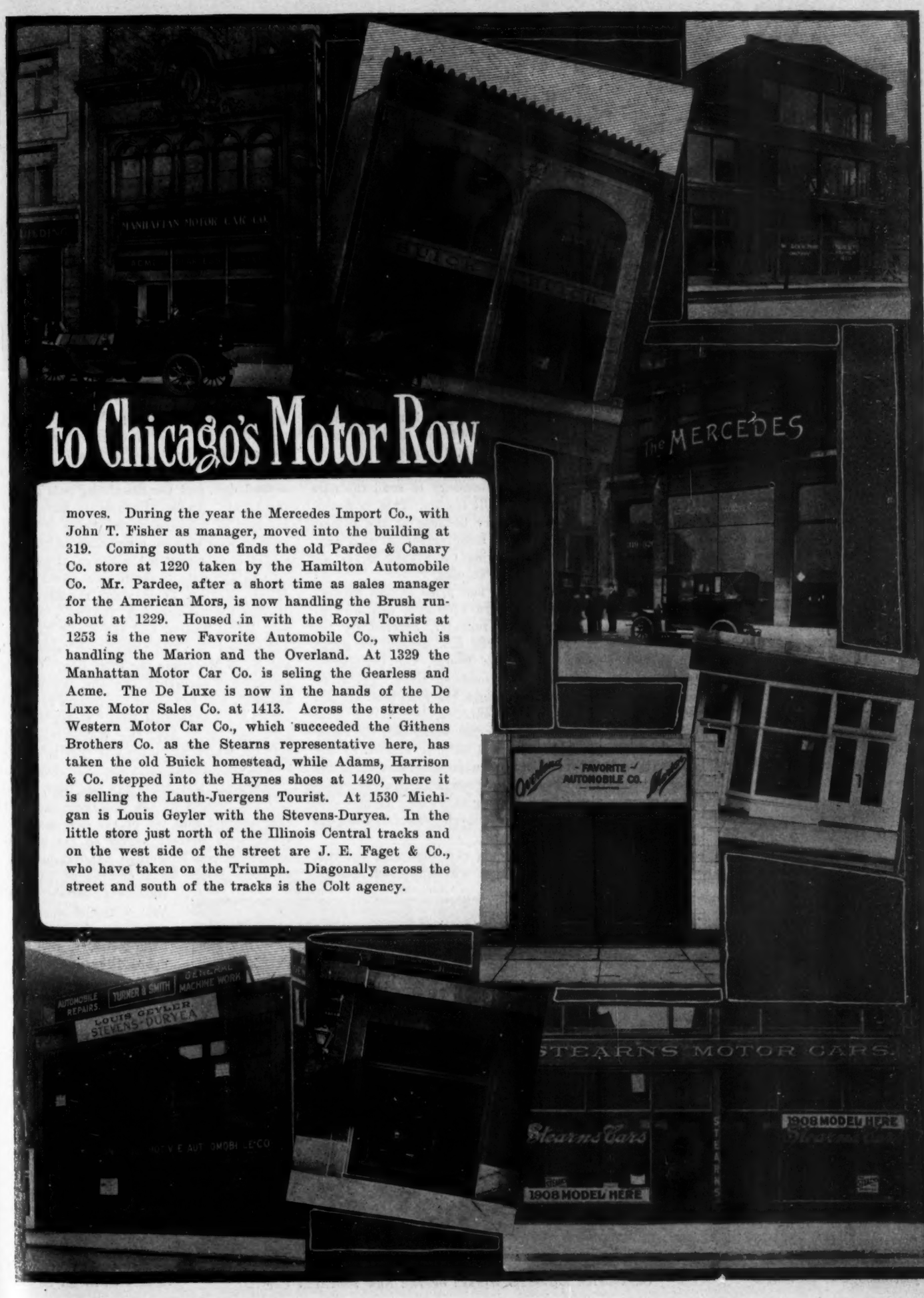
* * *

The Shooting Oiler of the Precision Appliance Co. is of the individual force feed type; unlike most of these, however, only one pump is employed, but this pump is so arranged it delivers to the various feeds in turns, and the length of its suction stroke is varied to suit the point to which it is about to feed.



Additions of the Year

CHICAGO, Nov. 30—As usual the past year has seen many changes along the local row. Agencies have been shifted, new stores erected and the tendency to move south is continued, the limit of the row in that direction being the new place of the Walden W. Shaw Co., now in course of construction on the northeast corner of Michigan avenue and Twenty-first street. The Haynes, Adams & Engs and the Baker electric are located on the west side of Michigan avenue, between Seventeenth and Eighteenth streets. The Rambler has moved into a handsome three-story establishment at 1464. A few doors north, at 1452, is located the Buick's effort. Continuing north one finds in the block between Thirteenth and Twelfth only one new place, that of the Ralph Temple Automobile Co., which put up its own building at 1219. From this point there is a big jump to the next new establishment, it being the mammoth International Harvester building located at the corner of Harrison street, in which the Webb Jay Motor Co. has taken quarters on the second floor. This represents about all the new structures added to the row, but there have been other changes and

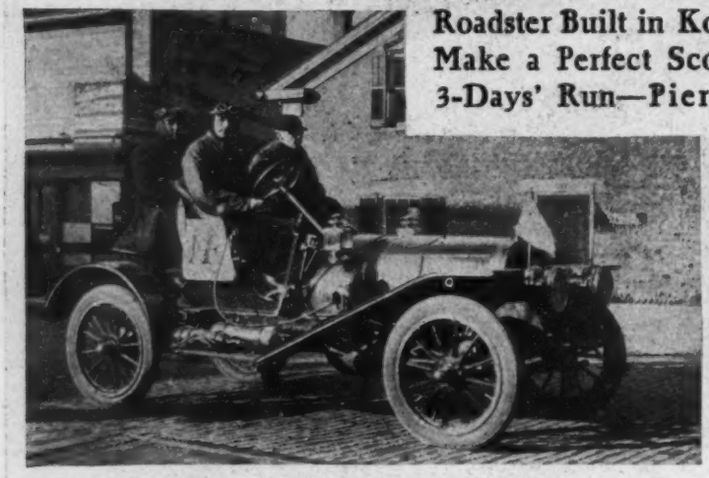


to Chicago's Motor Row

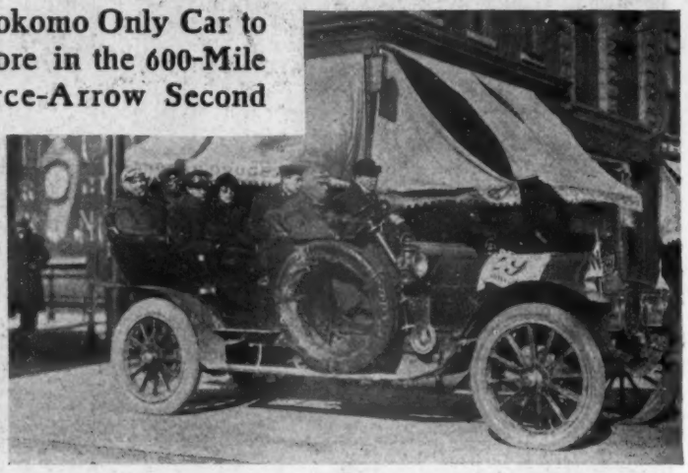
moves. During the year the Mercedes Import Co., with John T. Fisher as manager, moved into the building at 319. Coming south one finds the old Pardee & Canary Co. store at 1220 taken by the Hamilton Automobile Co. Mr. Pardee, after a short time as sales manager for the American Mors, is now handling the Brush runabout at 1229. Housed in with the Royal Tourist at 1253 is the new Favorite Automobile Co., which is handling the Marion and the Overland. At 1329 the Manhattan Motor Car Co. is seling the Gearless and Acme. The De Luxe is now in the hands of the De Luxe Motor Sales Co. at 1413. Across the street the Western Motor Car Co., which succeeded the Githens Brothers Co. as the Stearns representative here, has taken the old Buick homestead, while Adams, Harrison & Co. stepped into the Haynes shoes at 1420, where it is selling the Lauth-Juergens Tourist. At 1530 Michigan is Louis Geyler with the Stevens-Duryea. In the little store just north of the Illinois Central tracks and on the west side of the street are J. E. Faget & Co., who have taken on the Triumph. Diagonally across the street and south of the tracks is the Colt agency.

HAYNES WINS CHICAGO RELIABILITY TEST

Roadster Built in Kokomo Only Car to Make a Perfect Score in the 600-Mile 3-Days' Run—Pierce-Arrow Second



HAYNES ROADSTER, WINNER OF MILES TROPHY



PIERCE-ARROW SIX, WINNER OF GOODRICH ALE SET

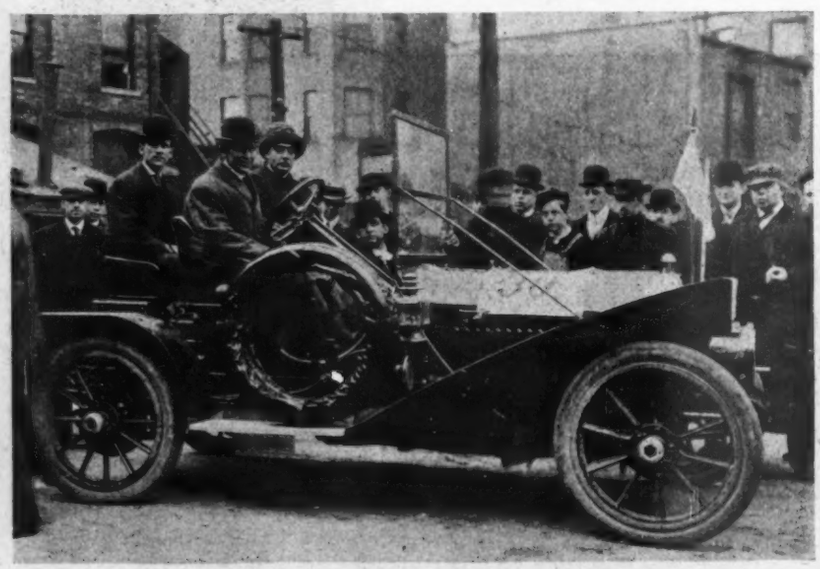
CHICAGO, Dec. 1—After the most strenuous and exhausting test ever given a lot of American motor cars, the Haynes 30-horsepower roadster, equipped with Diamond tires and driven by Frank Nutt, has been declared the winner of the 600-mile 3-day reliability run of the Chicago Motor Club on Tuesday, Wednesday and Thursday of last week over routes having for their turning points South Bend, Rockford and Ottawa, respectively. This great victory was achieved over a field of thirty-five American built cars of an average selling price of $3,250 and the Haynes car was the only one that survived with a perfect score. It made all its controls on time and did not have to make a single adjustment or repair on the road, surviving the rigorous examination as to its mechanical stability made by the technical committee in which the engine, ignition, transmission, brakes and running gear were found to be in perfect shape. This victory gives to the Haynes company, entrant of the car, the $1,000 Miles trophy, a bronze statue, the replica of which may be seen on every newel post in the Coliseum, Manager Miles reproducing it in staff. In addition Driver Nutt gets the McElligott cup which is given for the winning driver.

Second place was awarded to No. 29, the Pierce-Arrow 40-horsepower six-cylinder touring car, entered by H. Paulman & Co., and handled by Arthur Kumpf. This car is the veteran that is credited with 45,000 miles on the road, being best known to fame as the Glidden Pathfinder. Two turns of a grease cup shut the big Pierce out of a perfect score, the penalty for this being two points, just enough to prevent a tie with the Haynes, which would have necessitated a run-off which might have lasted all this week, the contest committee being determined to evolve a winner, even if it was necessary to send the cars 1,000 miles to split the tie. This, however, was not necessary because of the success of the Haynes. Running second this way, the B. F. Goodrich Co.'s $400 silver ale set goes to Mr. Paulman.

The third and last prize in this contest, the New Southern $300 cup, was won by the Oldsmobile roadster, entered by the Olds Motor Works and driven by Ralph Owen. Like the Pierce, the Oldsmobile was shod with Goodrich tires. The Oldsmobile went through the road test without incurring any penalties, but in the final inspection it was discovered that the emergency brake could only be classed as medium. Therefore a penalty of two points was imposed. Four more points were given for a driving shaft boot being loose, which made six demerit marks against the Michigan roadster.

Of the thirty-six cars that were entered, one, the Peerless, was scratched, and of the remainder twenty-five went through the 3 days' running. The others were withdrawn for various reasons, five of them being put out the first day, three of them the second day, and the remaining pair on the third day. These withdrawals were made because of mishaps, which made it advisable to stop because continuing to the end would have meant a big bunch of penalty points. The ones to retire were the Frayer-Miller, Marion, Thomas and the Stoddard-Dayton six the first day, the No. 7 Matheson, Royal Tourist and the No. 2 Jackson the second day, and the Pierce-Racine and the No. 6 Matheson the third day. Of the twenty-five survivors only one, the Wayne roadster, was penalized for failure to make controls on scheduled time. Going to Aurora the third day, the Wayne broke a spindle, which so delayed it that it failed to keep up to the pace.

When the last day's run had been made and the reports of the observers received they showed that ten of the cars had survived with perfect scores so far as the road work was concerned. It was predicted there would be a number of ties—at least five or six—and that a run-off would be necessary. The prophets little knew, though, the detailed examination as to the mechanical condition of the cars that the technical committee, David Beecroft, F. E. Edwards and Berne Nadall, proposed to make. It was not anticipated there would be penalties for loose lamps and speedometers, or that a committee would take cognizance of such a little thing as the driving shaft boot being loose; but it did; and in consequence of this several of the clean score cars were eliminated so far as first



OLDSMOBILE ROADSTER, WINNER OF THE NEW SOUTHERN CUP

place was concerned. Immediately the last car had been placed in the garage Thursday night the committee got busy with plumbline and tape, and started to take the measurements of each car to discover whether or not there had been any sag in the frame or springs. This work took all that night and up to noon on Friday, at which time the different cars were taken out one by one for the running test on the road. To start with, each driver was required to put on his reverse and back up, then he had to run through his gears, after which the committee gave each brake a careful test. After passing through this the car was run for two blocks, never beyond the legal rate of speed, to disclose the condition of the motor, there being a penalty attached for a cylinder not firing. The excellent condition of the engines was shown by the fact that of the twenty-five cars examined, in one instance only did a motor fail to hit every shot. The Dragon was the sufferer in this case, it incurring fifty points because one cylinder was missing. Before the trial each motor was allowed to run 15 minutes to warm up.

SCENE AT THE CONTROL AT MICHIGAN CITY

About the same generally good results were shown in the examination of the ignition system. In two instances only were penalties imposed and both of these were for dead batteries; the Locomobile No. 34 and the Jackson No. 11 being the sufferers. As a general rule, the brakes were found to be in excellent condition. Seven of the twenty-five survivors were penalized from two to four points in this department, all but one of them being classed medium, and on the remaining one, the Kisselkar, Webb Jay had neglected to adjust his emergency. It was in the running gear examination that most of the penalties were imposed. Here fourteen of the twenty-five cars were caught. Few of the penalizations were for serious causes, the most severe being the mishap to the radiator on the Maxwell, which put 900 points on that car. The Stevens-Duryea six caught 174 points for a bent front axle, and in the other cases, the highest penalty was twenty points, incurred by the Silent Knight, for a drag link replacement. The others were for minor causes and ranged from two to ten. Under the head of miscellaneous, fourteen of the cars suffered, the demerit marks being imposed for such things as damaged lamps, loose speedometers, running boards, aprons and fenders; broken bonnet clips, and horns out of commission on the long run.

There were, of course, penalties for breaking seals on the road, but it is a remarkable fact that the report of the technical committee shows that there were only seven cars caught in this manner. Two of them, the Pierce-Arrow No. 2 and the No. 34 Locomobile, were penalized, not because they broke a seal, but because it was equivalent to doing so through the inability of the committee to seal up the part involved. The Rapid bus broke four seals, and the Maxwell eleven, while the others only broke one each.

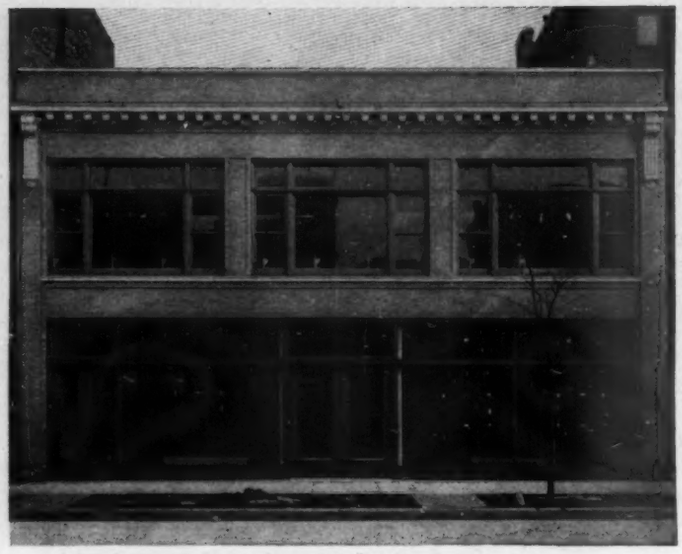
The road work penalizations were few. Under the head of engine trouble there were only four cases where difficulty was experienced, none of them at all serious except in the case of the Maxwell, which ran up a big total on the technical committee. Only three cars were penalized for ignition troubles, while the report shows that not a single transmission was wrong. Only twice did anyone touch the brakes for adjustment purposes, while the running gears

Results in the Chicago Show Reliability Run of Chicago Motor Club, Nov. 26, 27 and 28, 1907

No.	Car	Class	Type	H. P.	Tires	Entrant	Driver	1st Day Penalty	2nd Day Penalty	3rd Day Penalty	Final Test	Total
1	Royal Tourist	A	T. C.	45	Diamond	R. W. Cook	R. W. Cook	Not settled	35	Out		*
2	Pierce-Arrow Six	A	T. C.	40	Goodrich	H. Paulman & Co	Paul Hoffman	51	0	0	4	55
3	Rambler	B	R.	32	Goodrich	T. B. Jeffery & Co	Ted Collier	0	0	0	8	8
4	Peerless	A	T. C.	30	Diamond	W. G. Tennant	C. Burman	Scratched				
5	Wayne	B	R.	30	M & W	Wayne Automobile Co	Frank Gremel	0	0	620		
6	Matheson	A	T. C.	50	Diamond	Palmer & Singer Mfg. Co.	Ralph Smith	0	0	401	Out	401
7	Matheson	A	T. C.	50	Diamond	Palmer & Singer Mfg. Co.	D. Buck	16	Out			16
8	Stevens-Duryea Six	A	T. C.	50	Fisk	Louis Geyler	Clifford Clark	0	0	0	186	186
9	Stoddard-Dayton Six	B	R.	30-35	Goodrich	McDuffee Automobile Co	C. A. Englebeck	0	0	0	107	107
10	Jackson	C	T. C.	20-24	Healy	Jackson Automobile Co	E. F. Scheiffler	0	Out			
11	Jackson	C	T. C.	20-24	Healy	Jackson Automobile Co	F. L. Holmes	0	0	50	16	66
12	Autocar	B	R.	30	Fisk	James Levy Co	Barney Oldfield	0	56	2	16	74
13	Maxwell	C	T. C.	20	Goodrich	Maxwell-Briscoe-Chase Co	J. Mitchell	334	65	585	134	1108
14	Haynes	B	R.	30	Diamond	Haynes Automobile Co	Frank Nutt	0	0	0	0	0
15	Dragon	B	T. C.	24	Diamond	Dragon Automobile Co	J. W. Haynes	0	0	0	90	90
16	Rapid	C	Bus.	25	Firestone	Rapid Motor Vehicle Co	Frank Grogan	75	29	66	18	188
17	Frayer-Miller	A	T. C.	50	Diamond	Oscar Lear Automobile Co	J. Barnes	Out				
18	Auburn	C	T. C.	24	Goodrich	Auburn Automobile Co	R. E. Parker	0	0	0	10	10
19	Marion	B	R.	24	Michelin	Favorite Automobile Co	H. Stutz	Out				
20	Studebaker	A	T. C.	30	Diamond	Studebaker Bros. Mfg. Co.	J. Smith	0	4	0	12	16
21	Thomas Flyer	A	R.	60	Goodrich	C. A. Coey	C. A. Coey	Out				
22	White	A	T. C.	30	Diamond	White Co	H. K. Sheridan	0	0	0	137	137
23	White	A	R.	30	Goodrich	White Co	W. Leitch	0	0	0	12	12
24	White	B	T. C.	20	Diamond	White Co	C. E. Denzer	0	0	0	110	110
25	Reo	C	R.	18-20	Michelin	Walden W. Shaw Co	M. D. Vandecar	38	0	0	1002	1002
26	Matheson	A	R.	35	Diamond	Palmer & Singer Mfg. Co.	J. Heineman	235	Out			
27	Stoddard-Dayton Six	A	T. C.	50	Goodrich	McDuffee Automobile Co	Bert Payne	0	Out			
28	Kisselkar	B	T. C.	30-35	Goodrich	Webb Jay Motor Co	Webb Jay	0	0	0	18	18
29	Pierce-Arrow Six	A	T. C.	40	Goodrich	H. Paulman & Co	A. Kumpf	0	0	0	2	2
30	Oldsmobile	B	T. C.	38	Diamond	Olds Motor Works	Ralph Owen	0	0	0	6	6
31	Pierce-Racine	B	T. C.	40	Goodyear	Pierce Engine Co.	J. Hanson	9	0	Out		
32	Silent Knight	A	T. C.	35-40	Firestone	Knight & Kilbourne	D. Kilbourne	0	4	4	46	54
33	Locomobile	A	T. C.	40	Diamond	Locomobile Co. of America	H. F. Mitchell	0	0	0	14	14
34	Locomobile	A	T. C.	40	Fisk	Locomobile Co. of America	Fred Leiser	35	0	16	16	67
35	Premier	B	R.	24	Michelin	Premier Motor Mfg. Co.	R. McNamara	0	18	0	0	78
36	National	A	R.	50	Diamond	Ralph Temple Auto. Co.	John Aitken	0	4	0	0	26

* Finished as non-contestant. † Wayne penalized 2624 points for time.

of the cars were in general good condition, the four penalties in this department including a loose headlight screw, a loose lamp, a loose spring shackle and repairs to fenders. Also in connection with this final inspection was the weighing of all the cars for the purpose of securing the official weight of each machine as it is sold by the dealer to the customer. Each one of the twenty-five survivors was placed on record and the weights ranged from 1,900 pounds to 4,113 pounds.



FRONT OF GARAGE USED AT STARTING POINT

It was not until late tonight that the technical committee finished a compilation of its report showing the final standing of the contestants. By hard work, it managed to figure out the winner and the first ten cars last night, the delay being occasioned by several protests which had been filed with the committee. All of these, however, were satisfactorily settled before the awards were made public; but since the publication of them two more protests have been filed with Referee Donald, one of them by Thomas B. Jeffery & Co., entrants of the Rambler roadster, which finished fourth, and the other by the Auburn Automobile Co., which thinks the committee did not measure correctly when it declared that the axle wheels and spindles were out of line, and did not compare with the original figures.

Another phase of this contest and one which is generally overlooked in big affairs of this kind was the manner in which the tires stood up under the strain. True, the weather was almost ideal and the roads in fair shape, but nevertheless, when a gruelling contest of this nature, covering 600 miles, fails to develop any more cases of tire trouble than this one did, it speaks well for the progress made by the rubber concerns in producing tires that will stand up under such a strain. The Diamond came in for its share of the glory by having a set on the winning Haynes, which did not have the slightest sign of tire trouble on the entire trip. On other cars the Diamond also shone in a brilliant manner. The Goodrich people are proud of having six sets of tires in the first ten, and point to the fact that of the ten sets of its wares in the test there was only one puncture reported, and only in this one instance was it necessary to use the pump.

The first day's run to South Bend and return, in which twenty-three had perfect scores, made it look as if this event would be one of the sort in which the usual large percentage of perfect scores would be returned. The trip next day to Rockford and back, in which more were eliminated, made the critics sit up and take notice. The roads on Wednesday were good most of the way, but between Chicago and Elgin there were many spots where road repairs were going on. The morning was decidedly frosty and all during the day no one complained of excessive heat. Still, it was an enjoyable ride, and all along the route the motorists were given the glad hand. In the little towns particularly was this most noticeable, the farmers evidently having come from miles around to see the cars go by. The village constables stood in the middle of the town square and urged each driver to beat it as much as he desired.

The third and last day's trip was from Ottawa and back and, it being Thanksgiving, it was thought it would be hard work getting enough passengers. Such, however, was not the case, many being anxious to enjoy an outing like this on a holiday, and the small boys clamored long and loud for a chance to go on this trip. It was a day full of excitement, for it was the crucial point in the run. Those with perfect scores believed another good day would put them into a tie for the Miles trophy, while those who had been soaked for a few points only were hoping the fellows in front would get caught and come back to them. A couple of mishaps, neither one serious, although they might have been, occurred. The Maxwell had to climb a curb and run into a house to avoid a collision with the Wayne, which was moving carefully because of its broken spindle, while Pacemaker Van Sicklen near Wedron ran into a ditch in order to give one of the contesting cars the full road. Neither the pacemaker nor Frank Wood, who accompanied him, was injured, although the latter received a shaking up from which he did not recover for some little time. It was near this point that nearly everyone lost the road, which almost caused trouble for the technical committee. It was a case of follow the leader, and when the Royal Tourist and the Pierce went off the road the others followed like sheep. When they discovered their mistake there was an immediate hotfoot to get back on the course again, and although the lost ones had to travel 12 or 13 miles in order to regain their lost ground, each one made his control on time. The com-

CROWDS ALONG THE COUNTRY ROADS

CURIOUS SPECTATORS LINED UP AT OTTAWA

mittee ruled that no one should be penalized for this.

The farmers took advantage of the holiday and came to town to see the procession pass. Following is the detailed report of the technical committee on the results of the 3 days' reliability contest:

No. 14—Haynes roadster, 30 horsepower; winner of the Miles trophy; Frank Nutt, driver; class B; Diamond tires; official weight, 2,690 pounds; perfect score.

No. 29—Pierce-Arrow touring car, six-cylinder, 40 horsepower; Arthur Kumpf, driver; class A; Goodrich tires; grease cup loose, 2 points; official weight, 4,020 pounds.

No. 30—Oldsmobile roadster, winner of New Southern cup; Ralph Owen, driver; Goodrich tires; class B; emergency brake, medium, 2 points; driving shaft boot loose, 4 points; total, 6 points; official weight, 2,790 pounds.

No. 3—Rambler roadster, 32 horsepower; Ted Collier, driver; Goodrich tires; class B; pedal brake, medium, 2 points; lamp damaged, 4 points; speedometer loose, 2 points; total, 8 points; official weight, 2,875 pounds.

No. 18—Auburn touring car, 24 horsepower: R. E. Parker, driver; Goodrich tires; class C; axles, wheels and spindles out, 10 points; total, 10 points.

No. 23—White roadster, 30 horsepower; William Leitch, driver; Goodrich tires; class A; running board loose, 6 points; apron loose, 6 points; total, 12 points; official weight, 3,510 pounds.

No. 33—Locomobile touring car, 40 horsepower; H. F. Mitchell, driver; Fisk tires; class A; fan bolt off, 2 points; emergency brake, medium, 2 points; grease cup loose, 6 points; fender loose, 2 points; speedometer loose, 2 points; total, 14 points; official weight, 3,710 pounds.

No. 20—Studebaker touring car, 30 horsepower; William Smith, driver; Diamond tires; class B; exhaust cut-out repaired, 4 points; oil cup lost, 4 points; wheel belt broken, 8 points; total, 16 points; official weight, 2,905 pounds.

No. 28—Kisselkar touring car, 30-35 horsepower; Webb Jay, driver; Goodrich tires; class B; frame and engine bolt loose, 2 points; emergency brake not adjusted, 4 points; running board loose, 4 points; shield fastening bolt broken, 4 points; bonnet clip broken, 4 points; total, 18 points; official weight, 2,965 pounds.

No. 36—National roadster, 50 horsepower; John Aitken, driver; Diamond tires; class A; headlight screw loose, 4 points; muffler separated and hanging, 14 points; crank bracket loose, 2 points; gasoline tip loose and leaking, 2 points; loose lamps, 4 points; total, 26 points; official weight, 3,100 pounds.

No. 32—Silent Knight touring car, 35-40 horsepower; Don Kilbourne, driver; Firestone tires; class A; lamps loose, 8 points; oil pipe off, 8 points; drag link replacement on drive shaft, 20 points; joint cover loose, 8 points; work on lamps, etc., 10 points; total, 54 points; official weight, 3,325 pounds.

REAR OF GARAGE USED FOR CHICAGO MOTOR CLUB HEADQUARTERS

No. 2—Pierce-Arrow touring car, six-cylinder, 40 horsepower; Paul Hoffman, driver; Goodrich tires; class A; brakes, 26 points; emergency brake, medium, 2 points; lamp loose, 2 points; seal broken, 25 points; total, 55 points; official weight, 3,940 pounds.

No. 11—Jackson touring car, 20-24 horsepower; F. L. Holmes, driver; Healy tires; class C; battery wire repaired, 25 points; battery dead, 4 points; steering gear loose, 8 points; strut rod work, 4 points; seal broken, 25 points; total, 66 points; official weight, 2,700 pounds.

No. 34—Locomobile touring car, 40 horsepower; Fred Leiser, driver; Fisk tires; class A; brake repair, 10 points; spring shackle work, 16 points; battery dead, 2 points; grease cup loose on jackshaft, 6 points; horn out of commission, 8 points; seal broken, 25 points; total, 67 points; official weight, 3,690 pounds.

No. 12—Autocar roadster, 30 horsepower; Barney Oldfield, driver; Fisk tires; class B; work on spark plugs, 8 points; muffler, 4 points; emergency brake, 4 points; lamp, speedometer and horn loose, 2, 4 and 2 points, respectively; seals broken, 50 points; total, 74 points; official weight, 2,600 pounds.

No. 35—Premier roadster, 24 horsepower; Ray McNamara, driver; Michelin tires; class B; fenders repaired, 18 points; grease cup lost, 4 points; bonnet clip broken, 4 points; replacing fenders, 46 points; fastening seat, 4 points; fastening lamp, 2 points; total, 78 points; official weight, 2,518 pounds.

No. 15—Dragon roadster, 24 horsepower; J. W. Haynes, driver; Diamond tires; class B; one cylinder missing, 50 points; emergency brake, medium, 2 points; steering gear, 6 points; mud apron down, 26 points; shock absorbers, 6 points; total, 90 points; official weight, 2,440 pounds.

No. 9—Stoddard-Dayton roadster, 50 horsepower; C. A. Englebeck, driver; Goodrich tires; class B; replacing valve springs, 82 points; broken seal, 25 points; total, 107 points; official weight, 2,755 pounds.

No. 24—White touring car, 20 horsepower; C. E. Denzer, driver; Diamond tires; class B; fan blade broken, pump broken, pipe disconnected, 110 points; total, 110 points; official weight, 3,065 pounds.

No. 22—White touring car, 30 horsepower; H. K. Sheridan, driver; Diamond tires; class A; steering gear defective, 135 points; lamp loose, 2 points; total, 137 points; official weight, 3,735 pounds.

No. 8—Stevens-Duryea touring car, six cylinder, 50 horsepower; Clifford Clark, driver; Fisk tires; class A; bent front axle, 174 points; horn loose, 8 points; lamp loose, 4 points; total, 186 points; official weight, 4,113 pounds.

No. 16—Rapid twelve-passenger bus, 25 horsepower; Frank Grogan, driver; Firestone tires; class C, special; ignition trouble, 54 points; ignition troubles, 16 points; running board, 4 points; mud apron, 2 points; speedometer, horn and lamp loose and broken, 12 points; broken seals, 100 points; total, 188 points; official weight, 3,705 pounds.

No. 5—Wayne Roadster, 30 horsepower; Frank Gremel, driver; Morgan & Wright tires; class B; starting handle loose, etc., 20 points; broken spindle, 600 points; total, 620 points; official weight, 2,505 pounds.

No. 25—Reo runabout, 18-20 horsepower; M. D. Vandecar, driver; Michelin tires; class C; radiator trouble, 134 points; strut rod, 2 points; deck screws, 4 points; radiator, 900 points; total, 1,040 points; official weight, 1,900 pounds.

No. 13—Maxwell touring car, 20 horsepower; O. W. Klose, driver; Goodrich tires; class B; engine work and running gear repairs, 734 points; wheel replaced, 77 points; fan bracket and fan down, 12 points; strut rod, 10 points; broken seals, 275 points; total, 1,108 points; official weight, 2,122 pounds.

No. 1—Royal Tourist, 45 horsepower; R. W. Cook, driver; Diamond tires; class A; withdrawn first day.

No. 6—Matheson touring car, 50 horsepower; R. Smith, driver; Diamond tires; class A; withdrawn third day.

No. 7—Matheson touring car, 50 horsepower; D. Buck, driver; Diamond tires; class A; withdrawn second day.

No. 26—Matheson roadster, 35 horsepower; J. Heineman, driver; Diamond tires; class A; withdrawn first day.

No. 10—Jackson touring car, 20-24 horsepower; E. F. Scheifler, driver; Healy tires; class C; withdrawn second day.

No. 17—Frayer-Miller touring car, 50 horsepower; J. Barnes, driver; Diamond tires; class A; withdrawn first day.

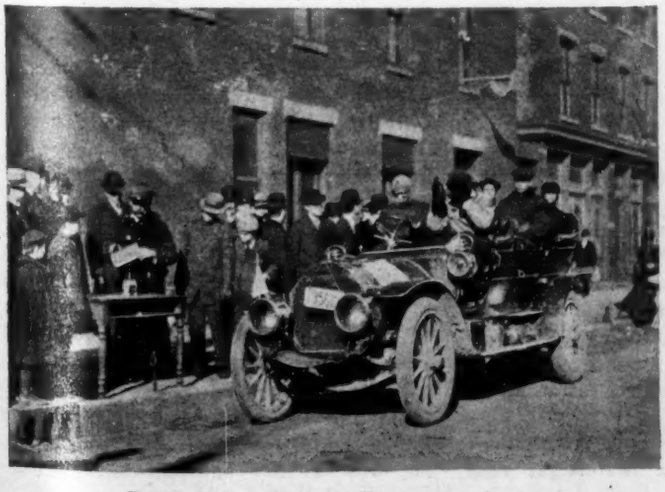
No. 19—Marion roadster, 24 horsepower; C. W. Price, driver; Michelin tires; class B; withdrawn first day.

No. 21—Thomas roadster, 60 horsepower; C. A. Coey, driver; Goodrich tires; class A; withdrawn first day.

No. 27—Stoddard-Dayton touring car, six cylinder, 50 horsepower; Bert Payne, driver; Goodrich tires; class A; withdrawn first day.

No. 31—Pierce-Racine touring car, 40 horsepower; J. Hanson, driver; class B; withdrawn third day.

No. 4—Peerless touring car, 30 horsepower; C. Burman, driver; Diamond tires; class A; scratched.



PIERCE-ARROW LEAVING CONTROL AT OTTAWA

CARL METZGER HANDS OUT PROGRAMS AT OTTAWA

COMMERCIAL SIDE OF THE PARIS SALON

Business Rig Proposition Given Considerable Attention by All the French Car Manufacturers

PARIS, Nov. 21—The commercial section of the Paris show for 1907 is given every bit as much importance as the pleasure car exhibition. There is a huge temporary iron building erected on the Esplanade des Invalides, just across the Seine, 5 minutes from the grand palace, and the attention given to this part of the show proves that the promoters were right in the estimation they had of the growth of this part of the trade. Practically all the principal makers are giving close attention to the commercial car business and there are also concerns which do not build anything but commercial cars. The general use of the gasoline motor in other directions than on moving cars has become more extended and there are on view some slow-speed groups for use with electric generating groups. The Bayard people are especially strong in this line, showing several 50 and 100 horsepower motors connected to electric dynamos. The Renault eight-cylinder ventilating group with air-cooled motors and a fan at each end of the group, is a new application, and so is its eight-cylinder water-cooled group with motors arranged in a V. This is proposed for a racing car but the concern does not intend to fit its 1908 racers with these motors. It also shows two marine groups with 50 horsepower motors and some delivery vans.

The Daimler company is showing an immense six-cylinder group of 150 nominal horsepower, proposed for a motor boat. It has an aluminum water-cooling casing, three ignitions, high and low tension and coil, double cardan joint, and reversing action. It also shows a new carburetor for use with benzol, made entirely of aluminum. The Latil front-axle transmission system is also making a good show, and it is certain that a system which can be fitted to almost any existing systems by removing the front wheels of the horse-drawn vehicle and adapting the remainder to the Latil group is sure to have a serious application. Thus there is on show a city sweeper with the Latil arrangement, all being complete on the front axle. The transmission to the front wheels, which are also steering wheels, is made by a double-grooved ball cardan joint. There is also a car for the transport of sick horses, the whole car tilting down backwards till the inclined flooring reaches the ground and the horse can step out. This would not be possible with the ordinary transmission.

The Brillie firm, advocate of the denatured alcohol which will shortly be pushed in France, is showing another of its six-wheeled omnibuses with double suspension. The two central wheels are driving wheels and bear the greater part of the weight, while the remaining pairs of wheels are steering wheels. There is more than one authority in France which holds that the six-wheeler is the future solution for the city omnibus traffic. The Regina is a newcomer in the trade and is giving most attention to heavy weights. A 5-ton lorry with chain cover is shown and another heavy truck of great capacity. The peculiarity of these cars is their rear suspension. The whole of the rear is suspended on three points, giving an equalized weight on any conditions of service and roads. The fronts of the springs are held by cardan-jointed shackles to the frame of the car in the usual manner. Not so the rear ends of the springs, which are shackled by cardan-jointed shackles to a crossbeam which is pivoted to another cross member forming part of the frame of the car. This pivot joint is about in the axis of the car, at the back of the rear axle.

The Darracq steam cars which were a feature of last year's show evidently have come to stay and one proof is the fact that they are to be seen on many of the French rural roads where tramway lines would not pay their way. No radical change has taken place, but a glance at the chassis exhibited would show that little improvement can be brought to bear on the excellent design adopted. This concern also is showing six-wheelers.

The U. D. P. X. is advocating the heavy trucks, in fact it makes no light weights. It shows a novelty in the nature of a car which is fitted with a 24-30-horsepower motor and which will consume gasoline, which is kept in a tank under the driver's seat. But this is not all. There is on one side of the car a gas generator or retort in which anthracite coal is tipped. This generator passes the gas to a cooler at the rear of the car, whence it passes forward on the opposite side of the car to a purifying filter. Following on this is a mixing chamber, and the gas is then ready for use in the motor, passing through the same carbureter as the gasoline, which latter is only used as a starter or duplicate means of propulsion. The cost of running the car under the gasoline-gasogene arrangement is stated to be a cent per car mile.

The Turgan lorries are remarkable from the fact that the seat of the driver is situated above the motor group, thus leaving the entire available space for the load of the car. This concern shows a centrifugal cooler, which insures a splendid cooling system. The cooling water is pumped up to above the motor group in front of the driver and there is a fan, operated also from the motor, which secures a thorough cooling of the water in its location in the cooler thus placed.

The Orion cars are arranged with their gearsets inclosed in a watertight case filled with petroleum jelly, which insures an absolutely noiseless application of these parts. The Saurer firm of Zurich is showing a moving model of a big lorry, with the motor in section, an interesting and practical proof the workmanship being exposed to view.

There is a Renard train consisting of a 75 horsepower gasoline car, operating by flexible cardan transmission, first a saloon car, following by first, second and third class passenger wagons and a baggage compartment. This is of course destined for road traction, and will find application in places which would not pay for the laying of street railway lines, or where steam trains are infrequent.

The Roval cars are somewhat of a novelty. The driver sits over the rear axle and beneath him is situated a vertical motor group, transmission and all mechanism pertaining to the van. All the remainder of the van is free to be taken up by parcels, boxes, special bodies or any other application to be made. In the case of one van to one man, the driver can also watch over his goods without anxiety, having them always in front of him. The applications of these ideas now are all to light vehicles.

The Turgan-Rusinol is an agricultural concern which used the Turgan construction and applies the same to its agricultural work. Haymaking, harvesting, harrowing, and other machines are on view, including a plow with five different shares, operated from a 24-horsepower motor. Several have shown tilting cars, this construction being useful for the transport of material and also for the transport of wounded animals or men. Military ambulances are sometimes built in this way and so are cars for the transport of horses. There are also several applications of fire engines. Delahaye is showing some fire engines on which the motor of course operates the fire pump as well as being used for the propulsion of the vehicle. The fourth speed of the car is used for the water pump.

In the 1906 salon was a retrospective exhibition of cycles. Regret was then expressed that the section did not include the early applications of the motor car. This year the missing link has been supplied and the result is unexpectedly interesting in character and extent. The exhibit is in the entrance vestibule of the great temporary building on the Esplanade des Invalides, and extends 40 or 50 yards down the aisle on either side, two or three cars deep, until the stands containing the recent conceptions of the craft bring one to everyday life again and the succession of industrial cars immediately following show that the preceding efforts have none of them been in vain.

Starting as long ago as 1769, when a French military engineer was experimenting with a very unwieldy steam three-

wheeler, which, however, had more of the modern car in it than might be expected, its immense proportions give way to a better attempt, 100 years later, which already showed great improvement of practice if not much in idea. The early steam cars were evidently what set brains to work on the explosion motor and for years, round about the '80's, the steam carriage was in evidence. Year after year one finds the perfection of the gasoline engine cutting out the steam votaries and with the promotion of European road races the latter obtained a coup de grace only to be revived of late by a modified form of engine. An inspection of the cars shows what a deal of good effect the early road races really had on the industry in general, for the 1903 Bennett brought out some fine racing machines which clearly paved the way for the design of the modern touring cars.

Even electric vehicles had a short sprint of success, as witness the bomb-like car of Jenatzy in which he obtained a wonderful speed in 1901 of 67 miles per hour. Serpollet's first flash boiler, produced at 18 years of age, is shown. Renault, Mors, Brasier, Bollée, Panhard, Daimler and de Dion Bouton, all show their first efforts in this line. The six-cylinder as well as the four-cylinder was also known in the '90's, since Forest of Brest has trotted out some massive models of gasoline engines built in 1898 and thereabouts. The cylinders are vertically arranged in pairs, water-cooled, three cranks on one shaft, automatic valves and even magneto ignition is there. What can account for the neglect of the magneto during so many years? Certainly the exhibition of decrepit, yet brave-lookings models, is the best that could be collected in Europe and probably in the world, and is worth going a long way to see. It may be a long while before the cars are ever collected again.

Some of the models on view belong to the French patent office, but others were acquired by their constructors at odd times. Everything in this show spells progress, and one is inclined to wonder whether the next decade will present anything like the same evolution of ideas, models, practice and workmanship as appears in the 10 years just elapsed.

The builder of the Burlat rotary motor did not expect to achieve such fame as has been obtained at the salon. The car is one of the greatest novelties of the year and is more interesting every time the mechanism is examined. It is 3 years since the inventor presented his first model, but the present exhibiting proves that something practical has been achieved, as the motor is mounted on a chassis and is stated to give great efficiency. The motor is composed of four air-cooled cylinders and it is said the cooling is excellent, placed around an axle at 90 degrees' interval. There are two cranks at 180 degrees and opposite motors are mounted on the same axle. The axle is eccentrically located relative to the center of rotation of the four cylinders, and there is no articulation between the piston and the piston rod. There is one explosion for every two turns of the crankshaft and for every turn of the motor itself. This explosion is obtained by making and breaking contact at one point during the revolution of the motor group. The equilibrium of the group is said to be excellent, and the number of parts constituting the motor is much inferior to that of the ordinary four-cylinder motor. The speed of the motor can be varied between 150 and 1,100 turns, the valves being held open by centrifugal force at the latter limit. The carbureter is automatic, the base chamber of the motors being the mixing chamber, and all tube feed is abolished. This most curious of motors is allowed to be a step in the right direction, notwithstanding the fact that the palace is full of vertical motor groups.

Of the 480 four-cylinder chassis exposed in the palace there are only twenty which are nominally rated at over 40 horsepower capacity. The majority of cars are rated by their makers at 10-20 horsepower and thereabouts. Surely such a few cars being rated at above 40 horsepower proves either that the makers have underrated their vehicles in order to gain popular favor, since the fashion has now set in to possess a moderate-powered machine, or else the advent of the six-cylinder has had something to do with the back seat and modest pretensions of the four-cylinder. Some French technical writers are not slow in stating that the motors are underrated and that in reality they are capable of giving an output much superior to that stated by their makers. In fact, there is a feeling that the output of the motor should no longer be distinguished by the nominal horsepower rate, but by the dimensions of the cylinders and of course the number of cylinders. Thus the output of one firm could easily be compared with that of another for any fixed price. The motor-using public is now educated to the possibilities and the expectations to be derived from a four or six-cylinder motor of such a dimension, and some of the makers bracket the dimensions of the cylinders against the nominal rating when advertising their cars.

Here are some of the anomalies of the four-cylinder motors as exposed in the Paris show. Of the 480 four-cylinder motors exposed there are seventy-five different sizes of cylinders, varying from the 3-inch bore and stroke to the monster of 7-inch bore and 6½-inch stroke. Such a large number of motors of different bore and stroke shows that standardization as regards size and power of motors is far from being practised by French makers who follow their own whims regarding the best size for the cylinder. The 90-horsepower Charron has has a 7-inch bore and a 6⅜-inch stroke and this may be calculated to give 125 effective horsepower, the most powerful four-cylinder in the show. The smallest four-cylinder again is the Deemester, 72 by 80 millimeters, rated at 10 and of 11 effective horsepower. The efficient range of output of these four cylinders appears by common consent to be about 10 horsepower, and the Fiat people call their new cardan model a 20-30 horsepower, this representing this efficient range of the car.

The lack of flexibility of the four-cylinder compared with the six is being brought home at the Paris show. Brasier, for instance, is proudly showing his first six-cylinder model, capable of speeds anywhere within the limits of 8 to 65 miles per hour. In the two-cycle fraternity, of which there is an increasing number, there does not appear to be any inclination to claim an increased output per equal bore over the four-cycle type, but the two-cycle motors shown this year are admittedly excellent pieces of workmanship. There are also one or two makers of double-piston motors, similar to the Gobron motor, but no great interest is attaching to them. A curious fact is that there are fifty-six six-cylinder cars exposed and there are also fifty-six makers of voiturettes or small cars represented. The bulk of exhibitors hold to the four-cylinder motor, and it will be interesting to watch these proportions, as they vary in each annual show.

ENGLISH SHOW STATISTICS

London, Nov. 23.—Statistics compiled by H. Hewitt Green show that there are fewer cars on exhibition at Olympia than there were a year ago. There has been a slump in chain drive, the double chain having decreased from 30 to 17.7 per cent. There are three times as many applications of the single chain drive to a live axle as formerly. There are 560 cars shown by 154 exhibitors, the different countries being represented as follows: England, 294, as against 262 last year; Scotland, 19, '06, 23; France, 145, '06, 177; Italy, 28, '06, 35; America, 24, '06, 28; Belgium, 20, '06, 26; Germany, 19, '06, 18; Holland, 4, '06, 5; Switzerland, 3, '06, 2. Saxony and Spain show two each. Neither was in last year. Total, 1907, 560; 1906, 576. Other statistics are as follows:

Classification—	1906	1907
Light and heavy open cars	96	71
Cars with detachable covers	159	95
Cars with permanent covers	147	190
Voiturettes, two-seated	30	30
Racing cars	6	6
Totals	438	392
Chassis of all descriptions	138	168
Grand totals	576	560
Means of propulsion—		
Gasoline only	559	539
Gasoline and electricity	...	1
Electricity only	6	5
Steam	11	15
Grand totals	576	560
Methods of driving—		
Chains, double	186	99
Chains, single	6	19
Total chains	192	118
Propeller, cardan-shaft	380	435
Electric, direct	4	6
Belt	...	1
Grand totals	576	560

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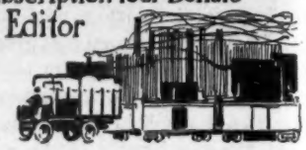

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SAM MILES' GREAT SHOW

CHICAGO maintained its reputation in the matter of show weather by greeting its visitors with a snow storm, sharp weather and low temperature despite the fact that the latter part of November usually hands out something pretty decent in the way of atmosphere. Perhaps it was all a part of the show program—to make people believe the dawn of spring at hand. It would not be a Chicago show without some touches of frost. But the weather did not prevent a most satisfactory crowd from attending the first few days and nights and it did not prevent the actual sale of cars.

The most pessimistic mortal on earth could not have stretched his imagination sufficiently to even make himself believe there existed a money flurry, much less a panic. So far at least there has been no talk of hard times—and there have been sales, real sales and not the kind that are for effect.

The show itself is a thing of beauty—a wonderful creation from the standpoint of decoration by the artist and the decorator who mapped it out, surpassing anything this country has yet seen. The most prejudiced easterner admits this Mr. Miles' show it so far ahead of Mr. Anybody's Else show as to have the others backed off the boards. The ordinary mortal could not begin to describe the gorgeous simplicity of the affair—nothing but ocular demonstration could tell the tale.

In size it is easily supreme, not only as to the number of exhibitors but as to the amount of floor space utilized; in attendance it may not outstrip New York and it would be strange if it did. But the people who are attending this show are not there exclusively to gaze upon wonderful creations in the motor car line—they are there to buy. They come from the big cities and the little cities, from the towns and from the prairies—they are westerners and they include hundreds of farmers.

Do not overlook the fact that the farmers are the rich people today; do not imagine for an instant that they cannot afford motor cars; do not imagine they are howling hard times—they are not. They have the money and they are buying cars and they are going to be important factors in the game before long.

Chicago's show is an all-American show; in fact, it always was such. It is also a representative show, for it contains everything in the motor car line from the monster limousine to the little buggyabout that saw its birth in the west, where it has thrived exceedingly. It is only natural that the west should demand more of variety than the east, for its needs and its roads are more diversified than are those in the east. It is not the buyer of the buggyabout and the little runabout exclusively; even the farmers and the people of the smaller cities demand something more speedy and with more carrying capacity than these afford—and they buy what they want.

It has been discovered—and this show has proved it—that the west is an open market and one upon which the makers of all sorts of cars must depend to a large extent for an outlet for their product and they are catering to this endeavoring to secure trade.

Strolling up and down the broad aisles of the show buildings one bumps first into the beautifully gowned woman of the Lake Shore drive and then into the man from La Salle county; then into a stockman from Kansas and again into the merchant from Des Moines. Isn't this cosmopolitan enough for anybody? Doesn't this indicate that all sorts and all classes of people are interested in the motor car? Doesn't this show that the great American public is soon to be skipping about the country on wheels, and doesn't this sound the knell of the bad road?

What of the time of holding the show? Is it too early for the maker and the dealer and the purchaser? The business results of the show will tell this tale before another half week has passed; but there is every indication that no maker will have cause to believe there is no business to be had, even if he does have to send his wares out among the farmers and the ranchmen and the little merchants. All he wants is business, and that he will have from the great and woolly west; and he will have a pretty decent feeling for the great and woolly west before the year 1908 shall have come to an end—and also for Sam Miles and his show.

There is some talk of one national show for the future—a show that shall be for the trade and not a selling show. Would it not appear that Chicago is the logical place for holding such a show?

LESSONS OF A CONTEST

MANUFACTURERS of motor cars do not enter cars in reliability contests for the mere purpose of winning prizes—they go in with a view of learning the weak spots and the strong parts of their wares. As a rule they are only too willing to find out where they can improve in order to satisfy an exacting public and to know that what they make is approaching perfection.

The recent 600-mile reliability contest held in Chicago proved more of an object lesson to the makers of motor cars—and incidentally to the makers of some accessories—than had been anticipated; and, also incidentally, the public has been given some knowledge that it did not have before. A more severe test could not have been imagined; the work of the manufacturers has been surrounded with as much care as could reasonably be expected. The work of most of the cars on the road was practically perfect; in fact, troubles on the road directly traceable to any oversight of the makers were few. The final very close examination of the cars and the final road test proved that there was some lack of careful assembling and inspection and considerable lax methods employed in the matter of attaching accessories, all of which while not at all vital defects, so far as the purchasers might be concerned, prove annoying and bring disrepute of mild nature.

There was hardly a case wherein real defective construction cropped out—there were cases, however, where carelessness was displayed not only in the matter of attaching accessories but in the matter of the quality of the accessories.

The contest proved that in the matter of motors and transmissions and running gears the American machine is able to keep well at the top and to withstand severe punishment on miserable American roads. The cases where trouble developed in running gears were few and were directly traceable to excessive speed with maximum passenger loads. As a sample, a seven-passenger car was driven at as high as 65 miles an hour—and is it any wonder that when the front wheels struck a bridge the result was a bent axle?

It was shown also that there was a lack of preparation for the contest and as a result penalizations were charged to some of the unprepared. The point here is that if the makers permit their own cars to go into a contest without preparation would they not turn their cars over to a purchaser in a worse condition?

IT takes a great reliability run like the recent test of the Chicago Motor Club to throw interesting sidelights on the motor game. The South Bend, Rockford and Ottawa trips brought to the attention of the users of motor cars the fact that the manufacturers of tires are so perfecting their wares that they are able to withstand even harder usage than they got in the Chicago event. Few of the thirty-five contestants had tire troubles and the records show that in no case was a car delayed because of puncture long enough to make it late at a control and suffer a penalty. When half of a field of this size can go such a distance without once using a pump it certainly seems that the tire-maker is holding up his end of the game.

THE race from Pekin to Paris promoted last summer by a French newspaper undoubtedly did the industry good in pointing out the possibilities of the motor car. People who ordinarily do not follow motoring news heard of the wonderful feat of Prince Borghese and through the publicity given the so-called race in public print they learned that even the desert has no terrors for this modern means of transportation. Now this same newspaper proposes to undertake a still greater feat, that of holding an endurance run from New York across the American continent to the northwest portion of Alaska, thence over the frozen Bering straits, across the plains of Siberia, through Russia and then through Europe to Paris. The run probably will start the latter part of February. This may sound like a rash undertaking to many, but those who followed the struggles of such men as Borghese, Megargel, Whitman and others who have blazed a way through apparently impassable country, believe such a contest is not beyond the range of possibility and that if it is held at least a few of the starters will pull through with credit to themselves and the cars they drive. It is hoped, and it does not seem to be a wild hope at that, that an American-built car will be one of those to roll into Paris at the end of the journey.

IT WOULD seem that we are about to start in on the commercial era. The United States has recognized the possibilities of the business rig through the commercial show which is being held in Chicago under the auspices of the N. A. A. M. This is only one of the signs of the time. France, always foremost in taking up motor ideas, is most enthusiastic over the exhibition of power wagons, which, while a side show to the salon, is a proposition of such gigantic proportions as to detract some of the attention from the salon itself. When such a thing as that can be done it would seem that France is fully awake to the situation and that from now on we can look for the furthering of the interests of the business wagon.

MEMBERS of the Vanderbilt cup commission must be sure of their ground when they can announce positively there will be a Vanderbilt cup race during 1908. It means there is a certain assurance that the Long Island parkway will be completed in time for the great international contest, for surely the commission would not go so far in the matter unless it was sure it could deliver the goods. Not one of them desires to risk another fiasco like last year's and the accompanying bits of scandal that floated around regarding the motives back of the abandonment of the annual race. There is no state in the east that will provide troops to guard the course, so it must be that the parkway is in such an advanced state that the commission feels safe in acting. One can wait until July 1 for the rules, entry blanks and course if there is an assurance that the race is a certainty.

SOME say that it is only the small committees that produce the best work, but such is not the case always. Therefore it would seem that President Hotchkiss, of the American Automobile Association, has shown considerable wisdom in having his executive committee increased from seven to seventeen. It looks a wise move.

ALWAYS it has been contended that if the government could be interested in the cause of good roads the movement would receive an impetus that soon would result in a wonderful and marked improvement in the system in vogue throughout this country. That the government is awakening to the possibilities afforded by a system of roads, like France's, for instance, is shown by the fact that Secretary of Agriculture Wilson has just filed with President Roosevelt his annual report, which discusses the proposition in many angles. It is interesting to note from the first census ever made of the road mileage, revenue and expenditures in this country that in the year 1904 there was in existence 2,152,000 miles of public road, of which 7.14 per cent had been improved. The report also shows that the total expenditure for 1904 was about $80,000,000. At that rate, if Uncle Sam can keep the pace, it will not be long before the good roads advocates will be holding up this country's system as one which can be copied with advantage by other governments. Another subject into which the government is delving is the dust nuisance, and it is probable that the investigations now in progress will result in some scheme whereby the rock dust now torn up and blown away by motor cars can be preserved as part of the road surface, which will be a decided step toward the preservation of the highways. Secretary Wilson evidently is a man wise beyond his years, and it is to be hoped he will not be content to stop his work for better highways where it is at the present time.

THE WEEK IN BRIEF

First half of seventh annual Chicago show proves brilliant success, exhibitors all declaring it to be ahead of expectations as regards business possibilities; decorations are finer than ever and first night's crowd a large one; fire threatens commercial exhibition, but flames are subdued without severe loss.

Twenty-five of the thirty-five contestants in Chicago Motor Club's 3 days' 600-mile reliability test survive, winning car being a Haynes roadster, driven by Frank Nutt, which is only one to make perfect score; Pierce-Arrow six is second and Oldsmobile roadster third.

Reports from Paris say that French makers are stirred by the commercial exhibit being made in connection with the Paris salon and that they now are fully alive to the possibilities of the game.

Pioneers of the Motor and Wheel hold annual meeting in Chicago and elect A. G. Batcheider president and G. G. Greenburg secretary-treasurer.

Secretary of agriculture makes interesting report to President Roosevelt concerning road mileage in this country in 1904.

E. R. Hollander makes first entry in proposed New York-Paris race, naming a Holtan.

COMING MOTOR EVENTS

Detroit Show—Detroit Automobile Dealers' Association's Show at Wolff's park, Detroit, week of December 9-16.

St. Louis Show—Second Annual show of St. Louis Manufacturers' and Dealers' Association, Jai Alai building, week of December 14-21; John J. Behen, chairman.

German Shows—Exhibition of touring cars in Berlin, Germany, December 5-15; exhibition of commercial vehicles, December 19-22.

Brussels Salon—Annual Belgian show, December 21-January 2.

Importers' Show—Importers' Automobile Salon exhibit of pleasure and commercial vehicles in Madison Square garden, New York, December 28-January 4.

Irish Show—Annual Irish show in Dublin, January 4-11.

Hartford Show—Annual exhibition of Automobile Dealers' Association of Harford, Conn., in Foot Guard armory, January 14-18.

Italian Show—Exhibition in Turin, Italy, January 18-February 2.

Baltimore Show—Annual show in Baltimore under the auspices of Automobile Dealers' Association, from January 21 to 26.

CENSUS OF THE ROADS

Secretary of Agriculture Reports 2,152,000 Mills of Public Highways in the United States

Washington, D. C., Nov. 30—Commenting on the work of the office of public roads the secretary of agriculture in his annual report just submitted to President Roosevelt states that during the past year the work of the office was divided into twenty-two projects, dealing with practically every subject of interest in connection with roads. This represents a greater number of projects than have been undertaken in any single previous year.

The close of the year marked the completion of the first census ever made to determine the road mileage, revenues and expenditures in this country. This investigation was begun early in 1905. Information covering the calendar year 1904 was obtained from carefully selected correspondents in every county in the United States, from state highway departments, state geologists, in fact, every possible source of information was used. The results show the enormous total of nearly 2,152,000 miles of public road; that 7.14 per cent of this mileage has been improved and that the total expenditures for 1904 was approximately $80,000,000.

Considering the fact that American improved roads have been in process of construction for a number of years it becomes evident, says the secretary, that the results which are being obtained are totally inadequate to the amount of money expended, and that the mileage is so great that it is necessary to classify the roads according to their importance, bearing in mind the fact that by far the largest proportion of the American earth roads must be maintained as such for many years to come.

The construction of object-lesson roads in co-operation with local authorities was continued during the year along the same lines as in previous years, excepting that greater attention was given to the building of earth, sand-clay and gravel roads. The trend of public opinion with reference to the public roads is indicated by the requests which have been received during the past year for the detail of men to lecture on road improvements. In former years the demand for lectures on road improvement came largely from road organizations, but during the past year requests were received from agricultural, industrial, scientific and commercial organizations which are taking up the subject. This is significant.

In recent years, says the secretary, perhaps the most important and certainly the most difficult problem which has engaged the attention of highway engineers is the prevention of dust. Until the general introduction of motor cars dust was considered as neither more nor less than a nuisance. The problem has now, however, assumed a more serious aspect. The life of the macadam roads depends upon the retention of the rock dust formed by the wearing of the surface. Under ordinary traffic conditions this dust remains on the road and consolidates to form a fresh wearing surface. But a heavy rubber-tired motor car moving at a high rate of speed produces a partial vacuum behind each wheel which sucks up the dust from the road surface and throws it into the air, to be carried off by the wind. This action soon strips the macadam road of all fine material, the result being that it soon disintegrates.

France, both by reason of its large mileage of macadam roads and the general use of motor cars, has given this subject the earliest and most thorough consideration. Investigations and experiments have also been conducted in England, and to some extent in this country. During the past year a thorough investigation was made of the systems in use in both France and England. Experiments with tar and oil were conducted during the past summer in Kentucky and Massachusetts with a number of materials and preparations designed to preserve macadam road surfaces.

Secretary Wilson believes this is a subject which should engage the earnest attention of the national government at once. No matter how important the United States may deem the building of good roads, it cannot but consider it even more important to preserve those which have already been constructed. Investigations of dust preventatives and road preservatives will be conducted by the office of public roads during this and the next fiscal year as far as its facilities will permit.

BONNET TEST IN CAPITAL

Washington, D. C., Nov. 28—Washington motordom is all agog over a sealed bonnet test which a local newspaper is promoting and which the Automobile Club of Washington will manage. The contest will take place December 10 and from the way the entries are coming in it promises to be the best motor event the capital city ever has had. The route selected is rather a hard one, part of it being through a hilly country, while other sections are over roads that are far from being perfect. The contestants will start from the country home of the Automobile Club of Washington on the Brightwood road and drive directly to Olney; thence to Ridgeville, to Cooksville, to Ellicott City, to Columbia, to Clarksville, to Ashton, to Sandy Springs, to Sligo, and finish at the clubhouse. The total distance to be covered is 115 miles. The club will entertain the contestants and the officials at the finish of the contest. This will be the first sealed bonnet test Washington motorists have had a chance to enter.

NEW BOARD IS NAMED

A. A. A. Executive Committee Is Increased to Seventeen Members—Other Appointments

New York, Nov. 28—President William H. Hotchkiss, of the American Automobile Association, announces the new executive committee of the association which will have charge of the association's affairs for the fiscal year beginning December 1, 1907, subject to approval at the regular quarterly meetings of the entire board of directors, selected by the sixteen state associations and the unfederated clubs. This committee comprises seventeen members, or ten more in number than its predecessor, this increase having been authorized at the recent annual meeting. The membership now consists of four officers, six chairmen of boards and seven directors at large, as follows: William H. Hotchkiss, Buffalo, N. Y.; Lewis R. Speare, Boston, Mass.; George E. Farrington, East Orange, N. J.; Charles Thaddeus Terry, New York, N. Y.; Asa Paine, Minneapolis, Minn.; N. H. Van Sicklen, Chicago, Ill.; Jefferson de Mont Thompson, New York, N. Y.; Frank B. Hower, Buffalo, N. Y.; Robert P. Hooper, Philadelphia, Pa.; A. G. Batchelder, New York, N. Y.; Stanford L. Haynes, Springfield, Mass.; F. T. Sholes, Cleveland, Ohio; Paul C. Wolff, Pittsburg, Pa.; Harry M. Rubey, Macon, Mo.; L. E. Myers, Chicago, Ill.; James T. Drought, Milwaukee, Wis.; Frederick H. Elliott, New York, N. Y. The geographical distribution of the committee covers ten states, of which there are six in the middle west. The first meeting will be held in the First regiment armory, Chicago, Friday, December 6, at which time the policies of the association for the ensuing year will be discussed.

President William H. Hotchkiss of the American Automobile Association announces the appointment of the new technical board which was authorized at the annual meeting of the board of directors, as follows: N. H. Van Sicklen, chairman, Chicago, Ill.; David Beecroft, Chicago, Ill.; H. O. Smith, Indianapolis, Ind.; Edgar Apperson, Kokomo, Ind.; Walter C. Baker, Cleveland, Ohio; Henry Souther, Hartford, Conn.; S. N. Colburn, Minneapolis, Minn.; E. R. Thomas, Buffalo, N. Y.; Clarence E. Whitney, Hartford, Conn.; E. T. Birdsall, Rochester, N. Y.; Angus Sinclair, Newark, N. J.; J. C. Kerrison, Boston, Mass.; Henry Ford, Detroit, Mich.; H. M. Rowe, Baltimore, Md.; A. C. Newby, Indianapolis, Ind.; A. L. Riker, Bridgeport, Conn.; Roy F. Britton, St. Louis, Mo. While it has been customary for the chairmen of the boards to nominate members to the president for appointment, in this instance, however, Chairman Van Sicklen waived the right and requested President Hotchkiss to

name such persons as he thought were best qualified to perform the important work of the technical board. The appointments are, therefore, besides the present technical advisors of the racing board, E. R. Thomas, A. L. Riker and Henry Ford, largely the nominees of the various state associations. While the committee now numbers seventeen, it is quite probable that the membership will be increased by additional nominees from the affiliated clubs and state associations. At the suggestion of President Hotchkiss, it is quite likely that David Beecroft will be named as secretary and vice chairman. The first meeting of the board will be held in Chicago December 6, at which time its organization will be perfected and plans laid which will, it is hoped, lead to a number of technical contests in different parts of the country, beginning early in the year of 1908.

FUNERAL OF GEORGE H. DAY

Hartford, Conn., Nov. 25—It was a noteworthy gathering of the representative citizens of Hartford that congregated at the Church of the Good Shepherd in this city this afternoon to pay the last tribute to the memory of the late George H. Day. Included in that congregation were many young men whom Mr. Day had helped up the ladder, likewise many a business man who directly owed his success to him. Rev. George T. Linsley, pastor of the church, conducted the services in accordance with the Episcopal ritual, assisted by Bishop Brewster and Rev. Dr. Francis Goodwin. The casket was completely covered with smilax and violets and was borne by colored porters. The honorary bearers were James B. Moore, Meigs H. Whaples, Charles E. Gross, William Waldo Hyde, Colonel William C. Skinner, John M. Holcombe, Dr. W. D. Morgan, Colonel George Pope and Milton J. Budlong. The services were simple and most impressive. The floral tributes were numerous and beautiful. Burial was at Cedar Hill cemetery. As a mark of respect to the memory of Mr. Day the entire plant of the Electric Vehicle Co. suspended operations during the funeral.

CUP RACE ORDERED

New York, Dec. 1—A meeting of the executive committee of the racing board of the American Automobile Association was held on Wednesday. After routine matters had been considered the meeting adjourned and immediately reconvened as the Vanderbilt cup commission. A resolution was unanimously adopted to the effect that the William K. Vanderbilt, Jr., cup commission promote a race for the Vanderbilt cup during 1908. The date of competition, the rules governing the competition, the entry blank, the form of declaration and the course will be announced by the commission by July 1. This is taken to mean the parkway will be completed in time for the race.

FRAME UP RACE RULES

Regulatations That Will Govern the Stock Car Contest Next Spring Are Announced

New York, Dec. 2—The automobile manufacturers' committee, as it is called, has promulgated its rules for the proposed stock car race next spring. They were adopted unanimously at a meeting of the executive board and rules committee held on November 25, Robert Lee Morrell, chairman, presiding, at which there were personally or by proxy the following: H. A. Lozier, E. R. Hollander, Benjamin Briscoe, F. P. Brand, Walter Allen, Andre Massenat, Hayden Eames, F. B. Stearns, A. H. Whiting and James Joyce. The rules follow:

1—The name of this race shall be called "The First American International Road Race" for stock cars.

2—The management of the race shall be vested in the following committees:

The executive board and rules committee shall frame the rules, under which the contest shall be held, including the fixing of the entry fee and qualifications of competing cars.

The racing board shall be vested with the power of actual preparation and running of the race under the rules as framed by the rules committee.

The technical board, under the direction of the racing board, shall examine the competing cars and report to the racing board whether or not they comply with the qualifications required by the rules.

The audit board, or a majority of its members, shall audit the vouchers of the chairman of the racing board before the same shall be paid by the treasurer, supervise the sale of programs, the erection of the grand stand and all other privileges.

The advisory board shall be kept informed of the work of the other committees and shall assist with such suggestions and advise as it may deem proper.

The board of trustees shall have the custody of the trophy under the conditions of the deed of gift.

3—The treasurer shall have the entire custody of the funds and shall only make such expenditures upon the vouchers of the chairman of the racing board, audited as above provided.

4—Any American or foreign stock chassis is eligible, providing its total piston area shall not exceed 103.87 square inches, which will admit the equivalent of a four-cylinder engine having a bore of 5¾ inches. This rule places no restriction on steam cars.

5—The word "stock chassis" shall mean that the maker of the same shall have actually manufactured and delivered, or have ready for immediate delivery, at least ten similar cars, in each and every respect, on or before March 31, 1908.

6—No more than three cars may be entered of any one make.

7—The number of cars which may be entered in the race shall be limited to forty. The first forty entries received shall be accepted. The date of the entry shall be taken from the postmark.

8—No individual can enter a car without the consent of the manufacturer of such car in writing, unless such manufacturer shall have failed to enter a car, within 10 days before the closing of the entries.

9—Bodies: The type of the body is left to the choice of the entrant, provided it has seats for at least two and carries at least two, driver and mechanic.

10—The entry fee shall be $1,000, of which $500 shall accompany the entry blank, the balance of $500 at the call of the racing board before February 15.

11—The racing board shall have the power to alter the course at any time up to the actual start of the race, if, in its opinion, it shall be necessary or advantageous.

12—The racing board shall have the power to establish such controls as, in its opinion, is necessary and proper.

13—Entries shall close January 15, 1908.

14—The racing board shall have the power to reject any entry within 5 days of its receipt without stating any reason therefor.

15—After the actual expenses of the race have been paid, any sums of money left over shall be used to refund to the entrants, pro rata, any sums of money paid for entry fee over and above $500. The remainder is to be donated to the local authorities for road improvement.

16—The road racing rules of the American Automobile Association shall be the rules of this race except where they conflict or vary from these rules, in which event these rules shall govern.

17—No repairs or adjustments may be made by anyone but the driver or driver and mechanic with the single exception of tire repairs and tire replacements. This does not apply to refilling a car with oil, water or gasoline.

18—Each make of car can have but one supply station, the exact location of which must be reported to and approved by the chairman of the racing board 48 hours before the race, which shall be under his official supervision to see that the above provision is carried out.

There was an official inspection of the course last Friday, resulting not only in approval but high commendation.

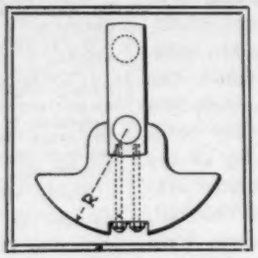
BOOMING LE MATIN'S RACE

New York, Dec. 2—The New York Times is devoting daily half of its front page and unlimited space to the proposed New York to Paris race, in whose promotion it is coöperating with Le Matin, which engineered to a successful conclusion the Pekin to Paris contest. Max L. Paroutaud, the American representative of Le Matin, has secured already from C. H. Tangeman the promise of a Hol-Tan car as a competitor. This, by the way, is heralded by Le Matin as the first entry to the race. The race will start, says the Times today, on a date at the end of February or the beginning of March. Pages and columns have been devoted to the discussion of the route and the possibilities of the accomplishment of the journey. The Times motor editor says his paper has the promise of several more American entries, whose names will shortly be announced. The contemplated route roughly outlined is as follows: To Chicago, 1,000 miles; to Saskatchewan, 1,200 miles; to Dawson, 2,100 miles; to Cape Prince of Wales, 800 miles; across Behring straits to East Cape, 50 miles; to Vladivostok, 2,500 miles; to Irkutsk, 1,500 miles; to Moscow, 2,700 miles; to Berlin, 1,025 miles; to Paris, 560 miles, giving a total mileage of 13,435 miles. If necessary coast steamers will carry the contestants from Vancouver to Skagway. If the ice is not strong enough crossing Behring straits a steamer may be utilized between Alaska and East Cape. Four routes across the American continent are suggested. The first is from New York to Vancouver, via the United States; from Vancouver to Skagway by boat, should this be necessary; then via White Pass, the Tanana river, and the Yukon river to a point near Koyukuk; thence across country to Cape Prince of Wales. The second is from Montana through Alberta and British Columbia via the Peace river pass to the route of the projected Grand Trunk railway. The third is through the chain lakes in winter to Mackenzie; thence by the Porcupine river to the Yukon. The fourth is similar to the first except that the continent would be crossed on the line of the Canadian Pacific. The route from Behring straits to Nijioudinsk had already been surveyed.

THE READERS' CLEARING HOUSE

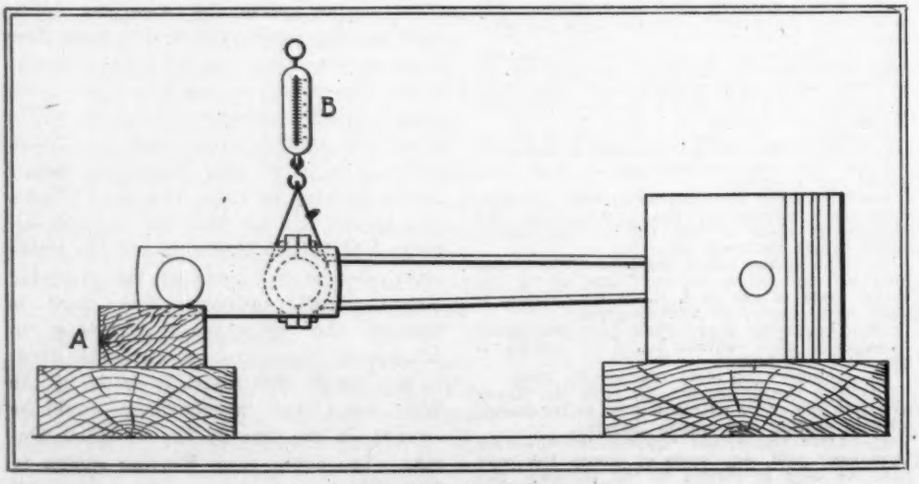
BALANCING CRANKS

Kenesaw, Neb. — Editor Motor Age—Will you please give me a formula for balancing a two-cylinder four-cycle vertical gasoline motor. Both cranks work together, with an explosion every revolution. Where is the best place to balance, on the crank arms or on the flywheel.—G. G. Schlegel.



BALANCING CRANKS—FIGURE 1

The common practice in balancing vertical single or two-cylinder motors is to counterbalance the crankshaft and other revolving parts plus half of the reciprocating parts. The effect of this is to neutralize half of the vibration, due to the reciprocating parts, and to introduce at mid-stroke an unbalanced horizontal vibration equal to the remaining vertical vibration. The counterweights should always be attached to the crank throws, never to the flywheel, and they are best secured as shown in the sketch, with two long studs, whose outer ends are riveted over their nuts. The first step in laying out the counterweights is to determine the available radius R, figure 1, which will generally be ½ or ¾ inch greater than the radius of the outer ends of the cranks. The total weight required by both counterweights is determined as follows: Rest the shaft on parallel metal strips A, figure 2, with the cranks and two connecting rods horizontal and the pistons supported in any convenient manner. Use a spring balance B, whose hook is passed through a wire loop passed around the crankpin between the connecting rods—in order to bring the vertical line of suspension through the center of the crankpin; read off the weight it registers. This represents the weight of the revolving parts at the radius of the crankpin, and is to be divided by two to apportion it between the counterweights. tons with its wristpin and tons with its wristpin and rings. To obtain the weight of the small end of the connecting rod the large end should be supported in any convenient manner as close to the center of its bore as possible, and the small end should be rested, as shown in figure 3, on a scale pan or should be suspended, as shown in figure 4, from a spring balance. The weight of the small end as thus determined is added to the weight of the piston, etc. The weight of the reciprocating parts for each cylinder, as thus determined, is added to one-half the weight of the revolving parts as determined in figure 2. The sum is the weight to be counterbalanced by each of two equal counterweights. Determining the size and shape of the counterweight will be a matter of cut and try and is most easily approached by cutting out a wooden form A, figure 5, of white pine board 1 inch thick and of such size and shape as seems available for a counterweight, using the radius R, figure 1. To this form tack a pair of light strips B, with a nail driven through at the shaft center C, and another nail to represent the crankpin center D. Using the nail D as a fulcrum, the vertical pull on the spring balance E is measured and is multiplied by 16, which represents the average ratio of weight between cast iron and white pine wood. The product thus obtained will undoubtedly be smaller than the weight required to be balanced by one counterweight. To increase it, simply increase the thickness of the counterweight as required, taking care to give clearance to the connecting rod and crankcase. If it is found that there is a considerable margin of width available the counterweight may be trimmed to the shape shown in figure 6 and a fresh calculation of thickness made. In order to economize weight the iron should be as far away from the center of the shaft as practicable. When the shape has finally been determined a pattern is made, allowing ⅛-inch shrinkage to the foot, and the two counterweights are cast and machined to fit the cranks.



BALANCING CRANKS—FIGURE 2

REASONS FOR POUNDING

Blue Springs, Neb.—Editor Motor Age—Kindly explain through the Readers' Clearing House why it is that on nearly all cars one cylinder knocks much quicker than the other in two-cylinder or others in four-cylinder cars. In my Maxwell it is the left, in my Pope the rear, in Buick and Moline the forward. As far as I have been able to trace them and in other makes I have always noticed that when pulling it never happens that all pound, but one much sooner than the rest. —Brown.

The obvious reason for one cylinder knocking sooner than the other is that many of the causes of knocking, such for example as pre-ignition, are local and do not happen to occur equally in both cylinders. One cylinder happens to get a little more oil than the other, and deposits more carbon; or one crankpin receives less than its share of oil, and wears loose sooner. In addition there may be special circumstances, such as the tendency of one of the main bearings—usually the front or rear—to wear down faster than the others.

TUNING AN ENGINE

Huntington, W. Va.—Editor Motor Age—I am in a little trouble here and take the liberty to ask you to help me out. I have a Haynes runabout car with two-cylinder engine. Recently I purchased a new commutator and don't think I have it on the shaft so as to fire at the proper time. It is fastened to shaft by setscrew. I have changed its position several times, with no better results. The engine does not fire regularly and heats quickly. What position should the piston be when the explosion takes place on starting engine? I have one more trouble which has recently developed. When turning the steering wheel either way from straight ahead it stops the engine. It does this whether the car is running or standing still, and it never fails. I have looked everything over carefully, thinking some of the wires had come in contact with a part of the steering wheel or its parts, but can find nothing near it and the more I look the more puzzled I am.—D. B. Kenney.

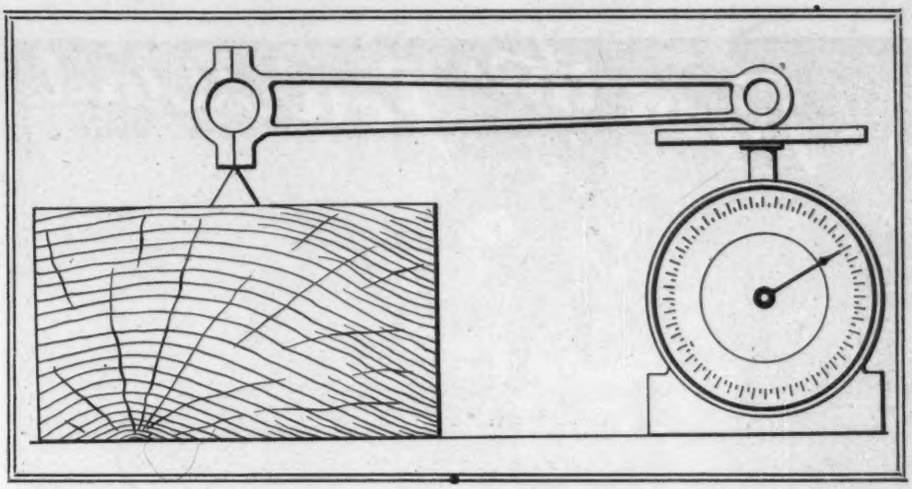
The piston should be precisely at the end of its compression stroke, or should

have started very slightly on the power stroke, when the explosion occurs. With the spark fully retarded for starting, it is probable that the spark is occurring too late. It is hardly possible to help you in locating the second trouble further than to say that the movement of the steering wheel or steering gear evidently affects either the wiring or the throttle connections in some way. A little patient searching, with the aid of another person to turn the steering wheel and a strong electric light to make sure that nothing is overlooked, should solve the problem.

STANDING OF A CHAUFFEUR

Sun Prairie, Wis.—Editor Motor Age—Has not the New York Correspondence School of Automobile Engineering consolidated with another school? What is the address? Is there such a school in Chicago? What is your opinion of the practical efficiency of a course in the above school? What is the price of a full course? Is it best when applying for a position as chauffeur to private parties to apply at a garage, or is it as well to apply at employment bureaus? What are the wages of drivers at Chicago or Cleveland, for instance? Do you think the prospects for the chauffeur's profession are constantly growing better? Is the season of car drivers for most drivers the whole year? Is not the social position of chauffeurs to private parties above that of the coachman? An article I read recently stated that the chauffeur is above the coachman in social standing in that he is rather in the nature of a social companion. Do you agree with this view? Can you inform me of any good, reliable articles in substance something like the above questions?—A. H. Fessler.

The Correspondence School of Automobile Engineering has consolidated with the New York School of Automobile Engineers, 146 West Fifty-sixth street, New York city. Correspond with the school as to terms. Motor Age does not express opinions regarding this or other particular schools, but as a general proposition it is self-evident that any sort of correspondence school course must be supplemented by considerable practical experience to enable the learner to apply his knowledge with accuracy and confidence. A garage is a safer avenue of employment than an employment bureau. The wages of chauffeurs are from $15 to $25 per week in the cities, and in special cases are higher. The season is apt to last as long as it is not too cold to drive with comfort, and in some cases, especially where closed cars are used, and the weather is not too cold, it may last right through the year. The question regarding the prospects of the chauffeur's "profession" and his social position indicate a misapprehension which is likely to make trouble, unless it is dismissed promptly. The chauffeur who presumes on his position to expect social consideration is guilty of an unwarranted presumption and is liable to find his path much less easy than the one who simply attends to business and lets his work speak for itself. The employment of the chauffeur offers many temptations both for illicit profits and for irregular living; and the fact that a great many chauffeurs yield to these temptations, instead of resisting them, leads their employers to tolerate them as an obnoxious necessity, while the scarcity of competent men leads employers to put up with conduct in their chauffeurs which they would not tolerate in any other employe. It is a fact that many chauffeurs show themselves so little able to uphold their self-respect against the temptations of their position that they shortly disappear from the motor car field and seek other and lower avenues of employment.



BALANCING CRANKS—FIGURE 3

ENGINES FOR MOTOR CYLES

DeKalb, Ill.—Editor Motor Age—Please advise me where I can buy motors for motor cycles from 1 to 2 horsepower.—E. O. Thompson.

Write the following: Aurora Automatic Machinery Co., Aurora, Ill.; G. H. Curtiss Mfg. Co., Hammondsport, N. Y.; Merkel Motor Co., 1098 Twenty-sixth avenue, Milwaukee, Wis.; Reading Standard Cycle Mfg. Co., Reading, Pa.

RECORD IS CLAIMED

Chicago—Editor Motor Age—We understand that the track record of the Harlem track, Chicago, is held by Webb Jay, a mile in 56 seconds. The way that we figure, the six-cylinder Stearns started ¼ mile behind the wire in the pursuit race October 12, making four rounds of the track, finishing at the wire, which would be 4¼ miles in 3 minutes 58 seconds for the 4¼ miles. Figuring on this proposition, it looks to us as if we had lowered the track record, showing some fractions less than 56 seconds. I would say that the only official record that gave us credit for 4¼ miles was the bulletin of the Chicago Automobile Club.—H. M. Burnell.

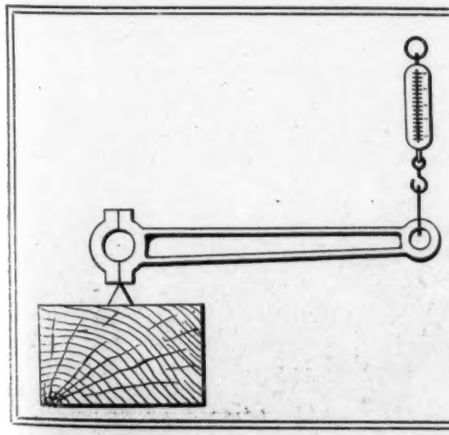


FIGURE 4 BALANCING CRANKS

FIGURE 6 BALANCING CRANKS

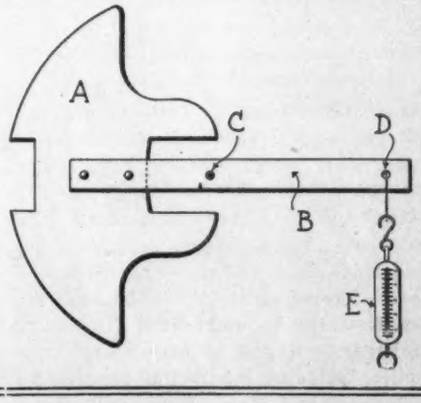


FIGURE 5

WESTON, RECORD-BREAKING PEDESTRIAN, GOING INTO CHICAGO—GEARLESS SIX HIS PACEMAKER

Victory for the Gearless—The Gearless Great Six has been coming into prominence of late, its latest feat being to win the touring car free-for-all hill-climb at Riverside, Cal. The course was 3 2-10 miles in length and of a 6 per cent grade, the Gearless going up in 6 minutes 16 seconds. The Thomas Flyer, Thomas Detroit, a White steamer and a Stearns. The Gearless also accompanied the veteran Weston on his walk from the Atlantic ocean to Chicago.

Merger Abandoned—The Chicago Automobile Club has withdrawn its offer to consolidate with the Chicago Motor Club, President Cobe of the former organization declaring in a letter to President Donald of the motor club that he believes the time is not right for such a merger and that it would be best for the organization he represents to withdraw the offer. President Cobe says he understands considerable opposition to the plan developed among the members of the motor club.

Want Another Run—Members of the Automobile Club of Philadelphia have expressed a desire to participate in another legal speed limit run, so it is proposed to hold such an event for a special cup on Saturday, December 14, the first car to start at 9 a. m. Enough subscriptions have been received by the committee on runs and tours to buy a cup, and it will become the property of the person who may be declared the winner of the run. Unless at least eight entries are received the proposed run will be abandoned.

Army Officers on a Test—Lieutenants Westcott and Gibbons, Twenty-first infantry, U. S. A., stationed at Fort Logan, Colo., have been detailed to go on a 3 months' surveying tour through New Mexico, Arizona and Colorado, the entire trip being made in a 40-horsepower Stoddard-Dayton. Preceding them will be four privates from the barracks with a provision and baggage wagon to take along camp supplies, including a barrel of gasoline for the motor car. The officers will travel over government lands to make surveys of them for the war and interior departments. This is the first time such a tour has been made by motor car detail from the Department of the Colorado. The provision and supply wagon will make about 25 miles a day, stop and camp for the night. The officers will cover probably 200 miles a day, returning nightly to camp in the motor car.

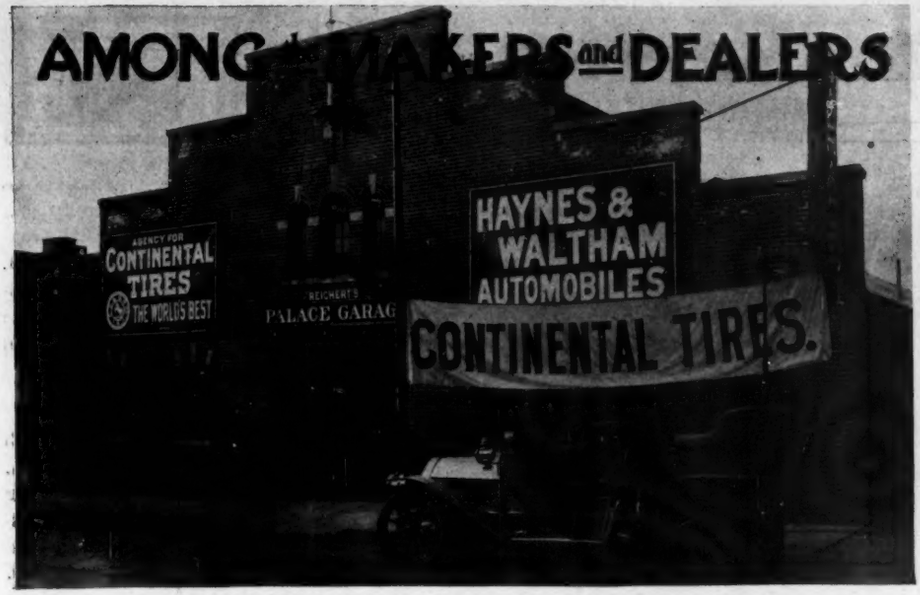
Unique Rambler Club—Every owner of a Rambler in America who has furnished proof of having driven his car 15,000 miles or over will be made a charter member of a most unique and exclusive club. It will be known as the Rambler Fifteen Thousand Club. Hundreds of owners, representing every state in the union, will be included. Yet the qualifications for executive positions are its most original feature. The president must have qualified for membership with the least expenditure for fuel, oil and repairs. The vice president will be the owner of the oldest Rambler car still in daily service. The second vice presidency will go to the owner who has actually covered the greatest distance. The secretary must have accomplished the most successful and economical single trip of greatest length. The treasurer will be the conservative and sane driver who has never been assessed a fine for speeding. In competition for these positions a woman may claim the office of president. Miss Helen E. Wood, of Philadelphia, has driven a Rambler 1906 model over 15,000 miles in less than 2 years. Her closest competitor is Dr. E. Ross Elliott, of Montgomery, N. Y., a physician who has used one Rambler for 4 years, traveling 25,000 miles at about half what it had cost to keep a horse.

Run Off to the White—As a result of a special contest held last week between the two White steamers and two gasoline cars which had tied for first place in the Del Monte, Cal., endurance run of the Automobile Club of California, held on September 21, the first award in that run goes to the White. Both of the Whites again made perfect scores in last week's contest, while both of the other cars suffered penalization.

Excelsior Company's Banquet—Twenty-six representatives of the Excelsior Supply Co. attended the banquet given by that concern at the Sherman house, Chicago, Sunday afternoon, the guest of honor being Joseph Gilbert, manager of the Continental tire interests in this country. The general policy of the company was discussed and great enthusiasm shown over the prospects. The report made by the representative who came from coast to coast shows that the total orders for November are 57 per cent larger than they were the same month last year.

Tangeman Enters a Hol-Tan—C. H. Tangeman, of the Automobile Club of America, has made the first definite entry for the proposed New York to Paris contest which is to be conducted next summer by Le Matin, the same paper that ran the Pekin to Paris race last summer in which Prince Borghese finished days ahead of the other competitors. Mr. Tangeman is to drive a 25-horsepower Hol-Tan car, with a special body, equipped for carrying a large amount of fuel and food supplies. The route to be followed will be from New York to Chicago, Alaska, crossing the Behring strait to Siberia, thence through Siberia to Russia, Germany and France to Paris.

BANQUET OF EXCELSIOR SUPPLY CO. AT SHERMAN HOUSE, CHICAGO



REICHERT'S GARAGE AT NEW HAVEN, CONN., HANDLING CONTINENTAL TIRES

Located in New Haven—One of the prominent garages in New Haven, Conn., is Reichert's, where the Haynes and Waltham cars are handled. In addition the place is an agency for Continental tires for that section.

Salon Decorative Scheme—The plans for the decoration and arrangement of Madison Square garden for the importers' show are widely different from the plans for other garden exhibitions of the past. A brilliant scene will greet the eye of the visitor to this importers' salon. Beneath a corona of many hundreds of electric lights the delicate color scheme of ivory and blue with fleeting glimpses of green will be one of refined beauty. The general decorative scheme of the interior of the garden for the salon will be a representation of a scene on a grand fete day along the Champs Elysees, the famous Parisian thoroughfare. The floor plan of the garden has been so altered for the salon that there will be a wide aisle down the center, parallel to which and on either side there will be two other aisles, making three longitudinal aisles in all. The same amount of ground floor space will be available as at the last show in the garden, but without the impediment of overhanging platforms on each side and other obstructions. The ground floor will be given over entirely to the exhibition of cars, while the superstructure or platform which encircles the arena, and the mezzanine floor, just above it, will be occupied by the accessory exhibits. The stairways to the balcony and gallery will be at the center of the sides and will lead direct to the top gallery. The top balcony will serve as a spectators' gallery and for the cafe; the gallery at the Fourth avenue end of the building, usually set apart for visitors, will be covered entirely by the largest canvas mural decoration which has ever been prepared for the ornamentation of the garden. The mural painting is 30 by 150 feet and is a representation of a magnificent park scene, in complete harmony with the general scheme. Visitors to the salon will pass from the foyer through a Louis Quinze gateway with a canopied ceiling. The walls of the gateway will be decorated with a painting embodying the idea of the "Spirit of Speed," the emblematical figure shown in the salon poster.

Fry a Receiver—On petition of creditors to the district court of Denver county a receiver was appointed for the Colorado Automobile Co., of Denver, of which B. B. Hall is proprietor. John H. Fry, manager of the Consolidated Supply Co., and one of the heaviest creditors, was named as receiver. An examination of the books and property of the company disclose the fact that the assets are about $2,000 better than the liabilities. The company has two carloads of new cars at the freight depot. These are Cadillacs for customers. The stringency in the money market is the cause of the company's difficulty. A number of prospective customers were not able to get the money from the banks to take the machines they ordered from the company.

Henry Changes Positions—D. W. Henry, formerly with the Electric Vehicle Co., of New Haven, Conn., will represent the Columbus Buggy Co. in the capacity of traveling salesman for the motor car end of that concern's business.

Changes Chicago Agency—The Supplementary Spiral Spring Co., of St. Louis, has changed its agency in Chicago and its product is now being handled by Page & Palmer, 1712 Michigan avenue, who are located in the same building with the Frayer-Miller people. Page & Palmer have the exclusive agency and their territory includes the states of Michigan and Wisconsin.

Dragons for Cuba—The first of the Dragon touring cars of the order placed by the new agents, Knight & Wall, of Tampa, Fla., for distribution on the island of Cuba, has been shipped by the Dragon company. The total shipments to be made before January 1 for the Cuban market will aggregate about twenty-five. This is to cover orders already placed and does not include meeting the current demand during the winter.

New Atlas Announced—The Atlas Motor Car Co., of Springfield, Mass., announces an addition to its line of two-cycle cars. The new brother will be a three-cylinder touring car with sliding-gear transmission and the first deliveries of this type will be made in about 4 weeks. The Atlas company has heretofore made a two-cylinder runabout with rumble seat, a four-cylinder touring car and a taximeter cab. The new type is put on the market in response to a demand for a car of this size to carry five people. The output of this type will be limited, it is said by the company.

DECORATION SCHEME FOR THE IMPORTERS' AUTOMOBILE SALON IN MADISON SQUARE GARDEN

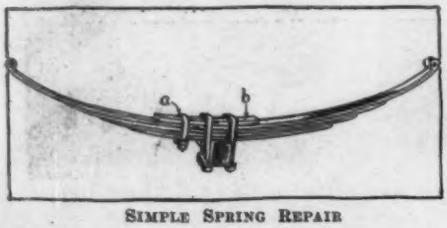
MOTOR CAR SHOP KINKS

A SIMPLE SPRING REPAIR

Of all motor car-spring breakages, it is probable that fully nine out of ten involve only the top spring leaf, with the fracture occurring very close to the clip, as indicated in the accompanying sketch. On this account provision for emergency repair is considerably less complicated than it might be were the manner of injury more various. If there are kept in the tool box the small emergency clip a, and the strip of steel b—a piece of an old broken spring will do very well for this—it becomes necessary only to loosen and tighten a few nuts to clamp everything together in the fashion illustrated, with the result that the car can be continued in at least reasonably hard service until the broken spring leaf can be replaced.

WHITE LEAD AND SHELLAC

These are two materials of such all-around usefulness that no motorist should be without them on a long tour. Indeed, a small can of the one and a bottle of the other, so packed as to avoid damage, are good things to have in the toolbox all of the time, since it is not possible to know when they may be wanted. White lead is chiefly valuable for making water-tight joints in the cooling system—where pipes screw together, where gaskets are employed, etc. Used for this purpose, a small quantity smeared into the threads of a coupling that is taken apart, or upon the seats and surfaces of washers or gaskets, will work wonders, practically insuring against leakage for an indefinite period. It is better, of course, to give it time to dry before using the car, if this is possible, but it can be depended to hold very well even while it is still soft, provided the precaution is observed of never applying to surfaces that present the least vestige of water or lubricating oil, which, if present, must be as thoroughly wiped off as is practicable. White lead is also valuable for any purpose where putty might be used, as in setting gage and indicator glasses of one sort and another, filling cracks in woodwork, stopping leaks in intake piping, etc. Even a radiator of the honeycomb type can be repaired well enough for temporary service, at least, by stopping the leaky portions up solidly with white lead. Under no circumstances will it be found to pay to use anything but the best and purest qualities of white lead, ground in the finest boiled linseed oil. This caution is particularly necessary in that the market abounds with all sorts of adulterated and imitation white leads, which a certain trade demands on account of their low price. Most of these are made of whiting and cheap oil, and are little better than the poorest putty. If any substitute must be taken, let it be red lead or zinc white, either of which will serve very well for most purposes. Shellac, because of its enduring quality and its property of drying almost as it is applied, is especially serviceable as a varnish, besides serving many other important purposes. The best shellac is the white, dissolved in pure grain alcohol. Yellow shellac, nowadays often made up with denatured alcohol, comes next, while a host of cheaper gums, usually mixed with wood alcohol, constitute the imitations that always testify to the merit of a genuine article. Most gaskets that are exposed to oil, and not to too great a heat, will hold best if wet with shellac before clamping in place. For rusty wheel rims, no paint or varnish is better than shellac, which, used for this purpose, will add greatly to the life of tires. Moreover, its ease of application and quickness of drying makes it not impracticable for it even to be applied on the road, while changing a tire. So with it at hand there is little excuse for the rust-rotted tire fabric that so often is a chief cause of rim-cutting and blowouts. If white shellac is available, it sometimes can be used to advantage to protect a wood body from the effects of moisture, when the paint is checking or scaling. Yellow shellac will serve as well, but will add its own tint to whatever may be left of the original color. To sum up the foregoing, for the reader with a poor memory, it will at least be helpful to recall that "white lead for water and shellac for oil" will cover most cases that may come up.



SIMPLE SPRING REPAIR

SEPARATING TIGHT PARTS

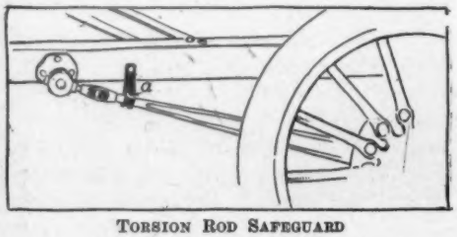
The separation of the different parts of a machine that may have become tightly stuck together because of dirt and corrosion during a long period of use often becomes a good deal of a problem; and if the nature of the parts that thus refuse to disassemble is such that a great deal of force cannot be used without danger of injury, the problem is intensified. In such a case, nothing promises better than recourse to a fairly liberal application of kerosene, supplemented by light but continued tapping with a hammer. By directing the taps judiciously, first in one direction and then in the opposite, now to one portion of the surface and then to another, and giving them as much force as is safe, long persistence will almost invariably result in the desired separation. Fresh applications of kerosene should be made from time to time, if necessary, to insure a supply constantly in place, ready to help by its property of penetrating to the finest crevices. For bolts and nuts, shafts, hubs and collars, pins and keys, etc., this method is widely recognized by expert machinists and repairmen as almost a panacea.

STOPCOCKS FOR HEADLIGHTS

Since the publication of the paragraph on the equalizing of acetylene lamp leads, by constricting the pipe feeding the larger flame, a correspondent has called attention to the fact that some acetylene headlights are provided with stopcocks, similar to those employed with ordinary gas jets, so that by the burning on or off of these any desired adjustment can be had to a nicety. Such stopcocks possess an additional advantage in that they serve to turn off one of the lamps in case of its becoming injured in any way, so as to permit the leakage of gas, while making its use impossible. With lamps of the ordinary type, not provided with such stopcocks, damage of the character mentioned necessitates unmechanical and time-consuming expedients in the way of kinking and tying rubber tubing, etc. In cases in which the manufacturer has failed to supply the stopcocks, they can be easily fitted, without even the necessity for soldering, by the use of the common kind made with ends of a shape adapted to force readily into the usual rubber tubing. Of course, the use of a metal sleeve to hold the stopcock to the lamp, supplemented by thorough soldering, makes a more substantial and permanent job.

TORSION ROD SAFEGUARD

On most shaft-driven cars the torsion rod is of such quality and design as practically to preclude the possibility of accident to it. Nevertheless, instances are not unknow of the front end of a torsion rod breaking, with the result that the rod drops to the ground, where its sprag-like action may even upset the car. To guard against this possibility, some manufacturers provide a leather loop a to catch the rod if it goes beyond its normal movement—a safeguard that the cautious motorist is wise to copy if he has any fear of this sort of mishap. This is a simple little bit of fitting that costs only a little time but may save money.



TORSION ROD SAFEGUARD

MOTOR CAR LITERATURE

The Maxwell catalogue for 1908 is out of the ordinary in that it opens with arguments in favor of a two-cylinder motor for vehicles up to 20-horsepower. Following this are arguments on three-point vs. four-point suspension and next in order are dissertations on the Maxwell combined clutch and gearcase as well as the Maxwell system of thermo-syphon cooling. This done the only work remaining is devoting consecutive pages to specifications of the various models.

Number 30 of the Rambler magazine contains a well illustrated story of the new four-cylinder Rambler cars.

"Thomas" in large letters across the top of the plain front cover page is the only exterior decorations on the Thomas 1908 catalogue which is made in very large size, 16 inches deep and 11 inches wide. The catalogue contains but eight pages. On the third page are details and half-tone reproductions of the town cab; the double center pages contain specifications of the town cab, the Detroit-Thomas, the 4-60 Thomas Flyer and the 6-70 Special. The last three pages are given over to dissertations on the last three named models.

"The Studebaker" No. 9 has a page story on the performance of the Studebaker 30 in the 24-hour race at Morris Park and also a page on the car exhibit at the New York show.

"White Route Book Number Five" gives detailed road directions for 1,500 miles of roads in New York state and the province of Quebec, Can. The routes included both directions between New York and Albany; the route northward from Albany to Saratoga and thence by way of Elizabethtown, Plattsburgh and Rouse's Point to Montreal; from Montreal along the north bank of the St. Lawrence to Quebec; and still another route by way of Tuxedo and Central Valley to Newburgh. Like previously issued White route books it is profusely illustrated and gives distance at each turn or land mark.

In the Marion catalogue are car, chassis and motor illustrations for the four and six-cylinder models. The descriptive matter is specially profuse.

The 1908 Franklin catalogue can properly be termed an artistic creation. Car and motor illustrations occupy entire pages, across the top and bottom of the remaining pages are landscapes or other sketches showing cars in operation and motoring scenes, the two center pages contain an X-ray of the four-cylinder motor, and the use of heavily enameled paper and two color effect is praiseworthy.

The Pierce-Arrow catalogue for next season's cars contains three-color full-page illustrations of the several models, there being in all four colored prints. The remainder of the catalogue containing a concise account of the cars is fashioned largely after the design of the last two seasons.

The Ford price list of parts for the 1907 models contains in addition to the parts and their value much information on the care of the several parts of the car. In this respect it differs from the regular instruction book in that the information is informative rather than dictative.

In the Merchants & Evans catalogue are special illustrations and description of the Hele-Shaw disk clutch. The half dozen illustrations show clearly every feature of its construction. Included in the book is the company's line of frames, springs, spring hangers, spring clips, spring shackles, car axles and change speed gearsets.

No. 30 Oldsmobile News Letter, designated the blue ribbon number, contains many touring stories written by users of Oldsmobiles. In keeping with the special title of the issue each pen-and-ink reproduction has a blue sky background.

"Automobil-Vergaser," by Heinrich Dechamps, and printed in German by Verlag von M. Krayn, Berlin, W. Germany, is a 138-page treatise on carbureters in which every part of the carbureter is dilated upon and illustrated with pen-and-ink reproductions. All types of carbureters are illustrated and described, the theory of carbureter action is covered and everything pertaining to motor fuels given.

The White Co., in its bulletin No. 13, devoted to a description of the new White factory, illustrates with two-color engravings the many departments of the factory as well as the machinery used for manufacturing the different parts of the car. The illustrations include the double milling machine for facing off the engine

cases; a group of automatic machines for turning out large parts such as ball races; a group of the smaller milling machines; a line of drills, special machinery for slotting burners, a lineup of lathes, and a lineup of grinders. Other illustrations of the factory include the frame assembly room, engine assembly department, body storage room, buffing and polishing room, brazing department, condenser room, testing room and the generator assembly room. The cover is a large two-color illustration showing one of the busiest parts of the factory interior. The centerpiece of the book is a bird's-eye view of the factory with a top border showing the seven successive models of the White car. The booklet is without doubt one of the best as yet issued on a motor car factory.

The Survey Map Co. in its map of eastern Maryland, comprising the district of Wilmington, Baltimore and Washington, D. C., together with the route descriptions for this district, employs a score of cardboards for maps and directions. The maps on each cardboard are but a portion of the entire district and by a scheme of lettering the margins on the several maps it is possible to place them together in the proper relation to other maps. This enterprising map concern has now in publication maps and routes for 185 trips.

"Gas and Oil Engines and Gas-Producers" is a recent publication by the American School of Correspondence in which the first department, "Gas and Oil Engines," is by Lionel S. Marks, of Harvard, and the second department, "Gas-Producers," by S. S. Wyer, who has written treatises on many similar subjects. Seventy-six pages are given to the first subject, sixty-two to the second, and in both parts are sectional illustrations of the engine and producer parts, together with efficiency tables and curves. The "Gas-Producer" diagrams are particularly clear and are lettered, which letters are referred to in the text.

The Union Pacific railroad is circulating a booklet upon its gasoline motor cars in which it publishes a map showing the route covered by these cars and illustrates the interior and exterior of the different cars in use.

Few catalogues have "processes of construction" better illustrated than the latest booklet published by the National Tube Co., in which every process of tube manufacture is illustrated. In the latter pages of the book are illustrations of many of the company's products.

BRIEF BUSINESS ANNOUNCEMENTS

Baltimore, Md.—The Mar-Del Co. has been appointed local agent for the Buick.

Trenton, N. J.—In the future the Richards garage will be known as the Kent garage.

Tarrytown, N. Y.—The Maxwell-Briscoe Motor Co. is erecting another building here. The new structure is to be 350 by 80 feet and will be devoted to an additional testing department.

New York—William Wooster, manufacturers' agent of motor car supplies and specialties, has removed from 88 Chambers street to 35 Warren street, where he will continue in the same line of business.

New York—H. H. Van Tine, who has been connected with the Automobile Exchange and Storage Co., and more recently with the Sidney B. Bowman Co., has joined the forces of the Garford Motor Car Co. in this city.

Milltown, N. J.—Burton Parker, who formerly was connected with the Hartford Rubber Co. and later with the Fisk Rubber Co., has joined the forces of the Michelin Tire Co. and in the future will be located at the main offices of the company in this town.

Yonkers, N. Y.—The Westchester Appliance Co. has been incorporated with a capital stock of $135,000. It will engage in the manufacture of motors, engines, etc. The incorporators are W. H. Cornell and M. C. Heine, of New York city, and J. L. Lockwood.

New York—William G. Feick, who was formerly the manager of the Motor Mart, has severed his connection with that concern, and in the future will have his headquarters at the Parkway Garage Co., of One Hundred and Tenth street and Central Park, west.

Menominee, Mich.—Fred Stukel and John Fish, Sr., have purchased the Wall property on Grand avenue, which up to the present time has been occupied by a blacksmith shop and paint shop, and after the necessary alterations are completed will open a garage.

New York—A petition in bankruptcy has been filed against the Duplex Ignition Co., of 507A West Thirty-sixth street. The company was engaged in the manufacture of electric spark plugs and general motor supplies. John Gruenberg was appointed receiver of the company.

Niagara Falls, N. Y.—The Niagara Auto Service Co. has been organized, and will operate a line between this city and Buffalo for the handling of both freight and passengers. F. M. Cannon has been elected president; J. H. Bridges, secretary, and treasurer, and H. R. Mansfield, general manager. It is also the intention of the company to operate a rubberneck line during the summer season.

Newark, N. J.—Newton A. Merritt has been appointed agent in New Jersey for the Goodyear Tire and Rubber Co.

Utica, N. Y.—The stockholders of the Utica Car Co. held a meeting during the week and elected the following officers: President, F. P. Miller; vice-president and general manager, E. P. Otis; secretary and treasurer, E. H. Morris.

Baltimore, Md.—A new company has been organized here to be known as the Ford Auto Co., and will act as agent for the Ford. The members of the firm are R. F. Kaehler, formerly of the Ford Motor Co., and A. M. Eastwick.

New York—An attachment has been filed against the Kalb & Berger Mfg. Co., manufacturer of bodies, at 532 East Seventy-second street. The company was incorporated in January, 1907, under the laws of the District of Columbia.

Boston, Mass.—The Frederick E. Randall Co. has been reorganized with the following officers: President, Milber Dykeman; treasurer, Mrs. N. C. Randall; secretary, H. F. Cross. Mr. Dykeman is the only new member of the concern. Chares Bates is to continue as general manager and superintendent and the company will retain the agencies for the Pennsylvania and Pullman cars.

Detroit, Mich.—The Grant Brothers Automobile Co., of Detroit, has been incorporated with a capital stock of $10,000.

Harrisburg, Pa.—The Bergdoll Motor Car Co., of Philadelphia, has been incorporated with a capital stock of $200,000.

Boston, Mass.—Howard E. Whiting, of Cambridge, has filed a petition in bankruptcy with assets of $7,926 and liabilities of $11,563.

Brooklyn, N. Y.—Joseph F. Cox, the manager of the Carlton garage, on St. Mark's place, has been appointed local agent for the Corbin.

Pueblo, Colo.—E. A. Grandy and Victor Mills have bought out the garage which was formerly conducted by E. A. Griggs at 418 Santa Fe avenue.

New York—A petition in bankruptcy has been filed against the Da-An-Nite Auto Supply Co., of 1912 Broadway, with liabilities of about $5,000.

New York—John J. Boylan has sold for E. G. Gason the four-story brick building at 625 West Forty-third street. The buyer will alter it into a garage.

New York—A petition in bankruptcy has been granted against Louis C. Howard, who has conducted a motor car business at 216 West Fiftieth street.

Indianapolis, Ind.—Fillmore Drake has joined the selling force of the G & J Tire Co., and will spend a great deal of his time in the Philadelphia territory.

Boston, Mass.—The Bullard Specialty Co., of Springfield, has been incorporated with a capital stock of $100,000. It will manufacture speed recorders. The incorporators are James H. Bullard and Alfred C. Fairbanks.

New York—The National Taxicab Co., of Manhattan, has been incorporated with a capital stock of $25,000, and will deal in and use self-propelled vehicles and motors. The incorporators are W. B. Vause, L. N. Vause, and E. Van Etten.

Grand Rapids, Mich.—W. S. Farrant has bought out the motor car business of Luce & Banks, of 87 North Division street, and will continue the business at the old stand. He has taken over the local agency for the Ford, which was formerly handled by the Richmond-Jarvis Co.

Brooklyn, N. Y.—The Cadillac company has made a change in its local agency. Instead of being a branch of the New York office it has been listed as a direct agency and will be under the management of Mr. Rourk, who formerly was in charge of the branch. The concern will retain the old quarters of the company on Bedford avenue.

RECENT INCORPORATIONS

Muncie, Ind.—Wolf Automobile Co.; capital stock, $10,000. Incorporators, H. H. Wolf, O. F. Raymond and R. W. Williams.

Richmond, Va.—Broad Street Auto Exchange; capital stock, $500 to $15,000; to deal in motor cars. W. Wilkinson, president; H. L. Roberts, vice-president, and J. G. Nelson, secretary and treasurer.

Detroit, Mich.—The Royal Motor Car Co.; capital stock, $100,000; to engage in the manufacture of motor cars and other motor-driven vehicles. Incorporators, Paul Arthur and R. M. Webster.

Camden, N. J.—Twin Lubricator Co.; capital stock, $200,000. Incorporators, F. Knowlton and E. D. Cronin.

Brooklyn, N. Y.—Carlson Motor Truck Co.; capital stock, $75,000; to manufacture motors, trucks, etc. Incorporators, C. A. Carlson, of 3204 Glenwood road, Brooklyn, and Charles S. Calvert, of Newark, N. J.

Brooklyn, N. Y.—Allen Swan Co.; capital stock, $27,000; to deal in motor cars. Incorporators, Kingsley and Halstead Swan and L. H. Allen.

New York—F. B. Stearns Co. of New York city; capital stock, $5,000; to manufacture motor cars. Incorporators, G. B. Daniels, D. C. Watts and W. E. Wilbour.

Connersville, Ind. — Connersville Motor Transit Co.; capital stock, $10,000. Incorporators, F. R. and G. R. Beeson.

Newark, N. J.—Howe Motor Car Co.; capital stock, $125,000; to manufacture and repair motor cars, wagons, boats, sporting goods, etc. Incorporators, A. E. Howe, M. F. O'Neil.